Common Plants
of the Western Rangelands

Volume 1

Grasses, Grass-like Species

Kathy Tannas

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AGRICULTURE, FOOD AND RURAL DEVELOPMENT

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Preface

The Taxonomist

At the end of a long sunlit day, a vast collection of vascular specimens is arrayed on the table, for the moment displacing a pile of unfinished paper work. Also present is a variety of texts and personal taxonomic notes, a hand lens, an intense light and the discriminating eye of the solitary taxonomist.

Each specimen is methodically dissected - a prominent ligule, two evident auricles, leaf blades distinctly veined below, no boat-shaped tips, rhizomes present. A short argument with oneself follows, self-recrimination, then a revelation, and a species name. The next specimens, willows without reproductive structures, will not be so easy.

Hours creep by, and what began as obvious differences in colour and pubescence blur into indistinctive shades of grey. The fatigued mind wanders to the also-pressed insect on a corner of a leaf, and regrets that a career in Entomology wasn't chosen instead. With the rhythmical snoring of the ever-faithful house cat comes a return to reality, also, finally, the lines of demarcation, and the Latin names fall into place. The specimens are returned to the four-year old scrap of newspaper, then back into the plant press. Outside, the wind still holds a bitter chill, but the snow has turned to rain. Overnight the gooseberries have burst into leaf. A few crocuses, fragile and vulnerable, peek through the withered grass. The first spring butterfly - a common alpine - was observed today, just emerged, drying its wings in the rising sun.

And so the taxonomist, although still weary from the previous season, is strengthened by this renewal of Life, the endless cycle of Creation.

Clare & Kathy Tannas

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It is also imperative to recognize the dedication and contributions of taxonomists and rangeland scientists over past decades. These individuals lay the foundations in botany and rangeland studies, and have made it possible for those of us currently in this field to work much more efficiently and effectively.

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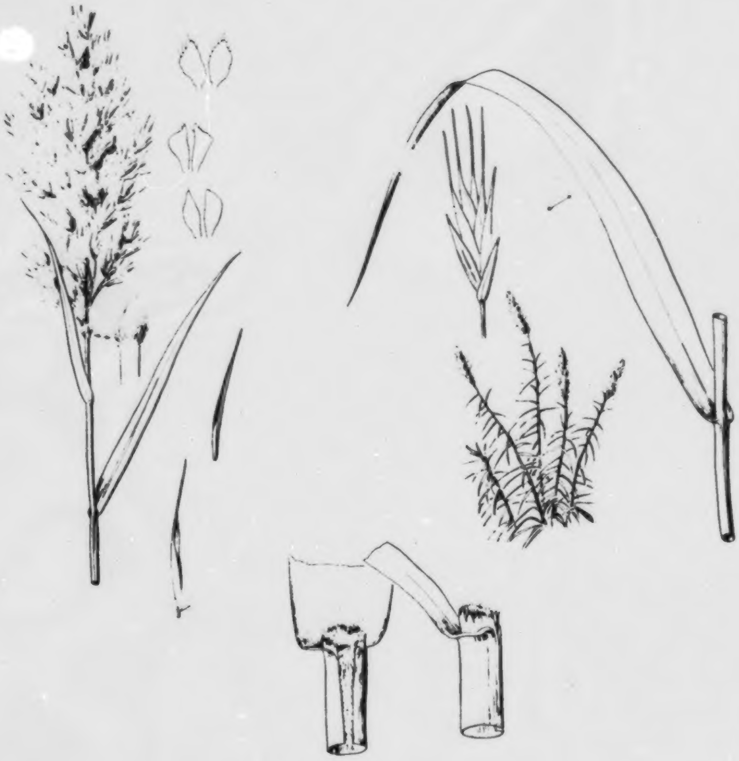
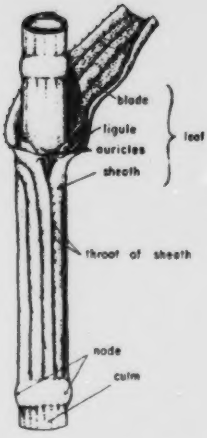
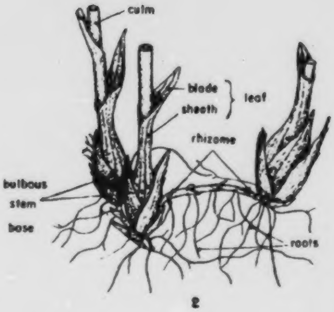


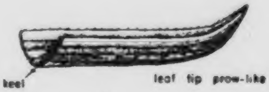
Phragmites australis


blade
ligule
auricles
sheath
leaf
throat of sheath
node
culm

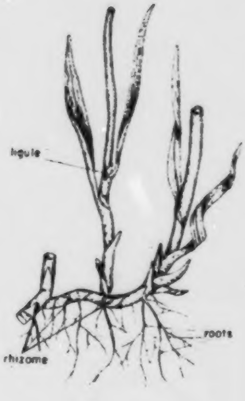
1


culm
blade
sheath
leaf
rhizome
bulbous
stem
base
roots

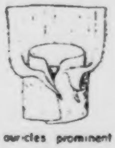
2


keel
leaf tip prow-like

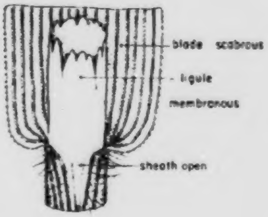
4


ligule
roots
rhizome

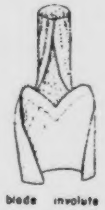
7


auricles prominent

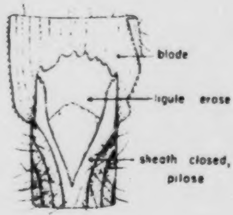
8


blade scabrous
ligule
membranous
sheath open

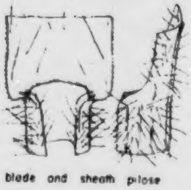
9


blade involute

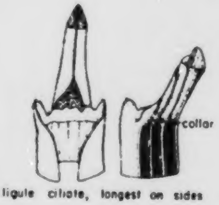
12


blade
ligule erose
sheath closed,
pilose

13

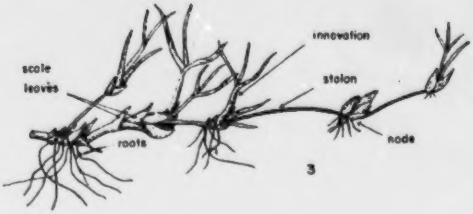

blade and sheath pilose

15

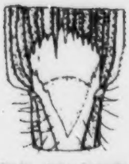

collar
ligule ciliate, longest on sides

16

Figures Showing Vegetative Features of Grasses

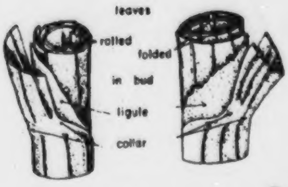

scale
leaves
innovation
stolon
roots
node

3

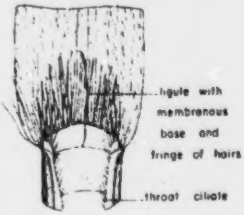


ligule erose-lacerate

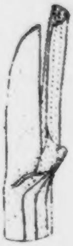
5


leaves
rolled
folded
in bud
ligule
collar

6


ligule with
membranous
base and
fringe of hairs
throat ciliate

10



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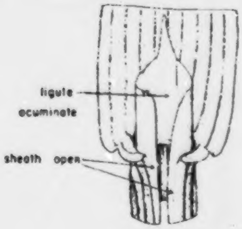
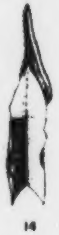

ligule
acuminate
sheath open

13a



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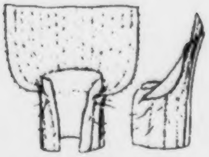
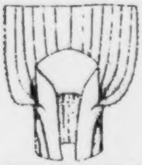


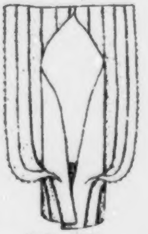
ligule truncate, ciliate

17



ligule obtuse, longest at center

18



ligule acute

19

Figures Showing Vegetative Features of Grasses

Introduction

The content as well as style and format of this book has been designed for all those with an interest in the plants that occupy our western rangelands - students, professional staff, ranchers and farmers, as well as the amateur botanist whose interest is purely recreational.

Plant Identification Component

An attempt has been made to simplify terminologies used to describe and identify the various plant species, but, at the same time, to include enough taxonomic detail to adequately separate one species from the next. To accomplish this, a number of strategies were combined - the use of bold print to "short-cut" identification, thus emphasizing only key identifying characteristics; the addition of both line drawings and colour photos as visual aids; the simplification and inclusion of habitat/distribution considerations in plant keys. This process of simplification created the problem of where to "draw the line" in eliminating certain species from the text. With something like 1800 vascular plants in Alberta alone, it was necessary to focus only on those species most commonly encountered in our rangelands. These include, in some cases, those that dominate in a single Ecoregion but are rarely found elsewhere, and alternately, plants that seldom form dominant cover but have a widespread distribution throughout all Ecoregions. In addition to the native species composition, a number of non-native plants have been described. Many of these are important forage species, others are very aggressive and are either currently threatening our rangelands, or have the potential to do so. By necessity, difficult groups - sedges, rushes, willows - were given less emphasis, with only the most well known and widespread species receiving mention (complete species lists and descriptions for the various Ecoregions can be found in a number of complete taxonomic texts).

Habitat and Distribution Component

In this component, each species is assigned to the Ecoregion(s) where it is most commonly encountered, and its typical habitat is identified. It is within this second, or habitat, category that correlations can often be made between an individual species and an Ecosite Type (or successional phase). When this relationship between a species and its habitat is consistent and predictable, it is known as an indicator of a specific ecosite. The presence of black spruce/Labrador tea, for example, indicates a more or less hygric, acidic site, whereas significant cover of kinnikinnick/buffalo-berry in western regions reflects a subxeric moisture regime. Conversely, in the case of difficult genera such as sedges and willows, ecosite characteristics can become a tool to verify a plant species' identity by incorporating habitat clues into a key. By using this species association technique, a sedge such as *Carex vaginata* would be associated with a hygric (often Labrador tea) community, just as *Carex stenophylla* or *siccata* reflect a subxeric environment.

Forage Value/Grazing Response/Notes Component

The primary purpose of the "Forage Value" section is to discuss the value of each plant species to livestock and wildlife. The value of a given species may vary, depending upon a number of factors such as season of use, habitat and availability and abundance of alternative forage. Thus, while relished by livestock in one area, the same species may be utilized sparingly when growing in another plant community. The term "Grazing Response" can be defined as the reaction of a given species when it is grazed. Although generalizations as to grazing response can usually be made, this reaction can sometimes vary from one microclimate and soil zone to the next. Thus, a plant may be an increaser in one region, but tend to decrease under a different combination of environmental conditions.

The final "Notes" component, by intention, is very brief, highlighting economic, aboriginal and medicinal uses of the plants. As well, most species are discussed briefly in terms of their importance in providing ground cover, potential for erosion control and any aesthetic appeal they may have.

The rangelands represented in this text are an intricate complex of plant communities, each of these a unique combination of grass and grass-like, forb and shrub species. The complexity in vegetation composition varies significantly from one area to the next. In the Mixed Grass Prairie, for example, it can be very simple, comprised of three or four major grasses and a few forbs, and will remain fairly stable and predictable until a major change in range type occurs. On the other extreme, such as can be found in the lush grasslands of the foothills region, it is not uncommon to encounter 35 or more species in a 100 m. vegetation transect, and this specific composition changing considerably throughout a relatively small geographical area.

Grasses/Grass-like Species

Grasses are by far our most valuable forage plants, in well managed pastures comprising up to 90% of the total grazing. Many are highly palatable, and their decrease in vigour and prominence correlates with deterioration in range condition. Bunch grasses, in particular, are sensitive to over utilization. They lack the option to reproduce vegetatively to any extent, and many, although producing abundant leafy growth, are poor seed producers. Grass-like species on the other hand, although members of large and diverse families, generally provide relatively small amounts of forage. Certain sedges and rushes are palatable, and in some localized situations, do rate among the most prominent species, and as such, are of some significance.

Forbs

Forbs are the best known and most easily identified members of the Plant Kingdom. From a rangeland perspective, however, most produce inferior quantities of forage, also do not have the curing properties characteristic of many native grasses. Most forbs increase with grazing pressure, their abundance an indicator of deteriorated range condition. Contained within this group are a number of species toxic to livestock. With the exception of larkspur, most of these are unpalatable and seldom ingested in any quantity under normal conditions. Also important are members of the legume family, most of which have the ability to fix atmospheric nitrogen. Some legumes produce large amounts of nutritious forage, others are poisonous, thus considered undesirable range species.

Trees and Shrubs

Trees and shrubs vary greatly in prominence from one Ecoregion to the next. In the prairie region, they usually comprise a very small percentage of the vegetation cover, in other Ecoregions form a large part of the plant community. Forage value also varies greatly, a few known to be toxic, many unpalatable and worthless to livestock and game, others highly nutritious and palatable, often relied upon exclusively as winter forage. In all Ecoregions shrub and tree components are valued as cover and habitat for wildlife. As a whole, woody species are persistent and relatively aggressive, thus have the potential to increase as range condition deteriorates.

The Ecoregions

Rangelands, by definition, are those areas which are conducive to utilization by livestock and game. Although most Ecoregions provide forage and habitat to some extent, this text deals with primary and secondary rangelands, thus eliminating peripheral regions in the extreme north as well as subalpine and alpine areas.

Within our western rangelands, five major Ecoregions will be discussed, their boundaries determined by environmental and ecological means rather than by political. Definition of these boundaries can be somewhat obscure, with transitional vegetation zones and exceptions to the rule not uncommon occurrences. For example, growing side by side on a bank in south Calgary are both plains rough fescue (*Festuca hallii)* and foothills rough fescue (*Festuca campestris)* both distinct and without apparent hybridization. Blue grama *(Bouteloua gracilis*) can be found in abundance on exposed, sandy slopes in the Foothills Fescue region, needle and thread (*Stipa comata*) and Indian rice grass (*Oryzopsis hymenoides*), although primarily species of the Mixed Grass Prairie, are present in all Ecoregions on suitable sites.

Within each region, numerous range sites, or ecosite types, can be identified, each of these with its own unique indigenous vegetation community which is best adapted to the specific climate and soil conditions. Over time, the natural process known as plant succession occurs, and the pioneer species that dominate initially will be replaced by climax vegetation. This perfect or "bench mark" plant community that develops, unless disturbed or abused, remains relatively stable and self-sustaining. Within a given rangeland, various successional stages can usually be recognized, influenced by such factors as uneven livestock and game distribution patterns, mechanical disturbance and natural occurrences such as fire and flooding. The result is a complex mosaic of plant communities and a highly diverse ecosystem. In cases where prolonged and excessive abuse or disturbance has negatively impacted soil conditions and depleted the seed supply, this successional process can proceed very slowly. With less severe disturbance, natural succession can develop relatively quickly.

1. The Prairie Region

The prairie occurs in the Brown Soil Zone of southeastern Alberta and adjacent areas eastward and to the south, also in the drier portions of the Dark Brown Soil Zone in these regions. Most productive soils are predominantly Chernozemic, the primary factor limiting plant growth in this area is the low annual precipitation (averaging about 300 mm.). As well, atmospheric temperatures are higher than in the other four Ecoregions. In the driest sites, upland grasslands are dominated by low growing, drought resistant species - needle and thread (*Stipa comata*), June grass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*) and such forbs as moss phlox (*Phlox hoodii*) and scarlet mallow (*Sphaeralcea coccinea*). Northern wheat grass (*Agropyron dasystachyum*) occupies the drier sites, western wheat grass (*Agropyron smithii*) preferring slightly moister and alkaline/saline habitats.

A common range type found in this Ecoregion consists of Solonetzic soils, where hard clays restrict water absorption and root penetration. Species common on these sites are tolerant of moderate salt and alkali accumulations (for example, Sandberg bluegrass - *Poa sandbergii*, Nuttall's alkali grass - *Puccinellia nuttalliana*, and gumweed - *Grindelia squarrosa*). More highly saline and alkaline situations are frequent around sloughs and lakes, and vegetation composition is limited to a few species adapted to these extreme conditions (i.e. salt grass - *Distichlis stricta*, prairie bulrush - *Scirpus paludosus*, and samphire - *Salicornia europaea*).

Sandy Regosolic soils, often producing rolling landscapes, are common throughout the prairies. Grasses such as Indian rice grass (*Oryzopsis hymenoides*) and sand grass (*Calamovilfa longifolia)* dominate, and shrub cover is often higher due to increased potential for root penetration and/or an elevated water table. Badland breaks, often calcareous by nature, support species like plains muhly (*Muhlenbergia cuspidata*) and thread-leaved sedge (*Carex filifolia*), and higher moisture regimes are transitional to such grasses as green needle grass (*Stipa viridula*) and western porcupine grass (*Stipa curtiseta*). Extensive shrub and tree cover is generally restricted to coulees, snow melt areas and along waterways, also to sandy areas with an elevated water table.

2. The Parkland Ecoregion

This region is located in the Dark Brown Soil Zone, also transitional to the Black Soil Zone northward. Chernozemic soils dominate on mesic sites, Luvisolic under tree canopies, Regosols in some sandy sites, and Gleysols in subhygric areas. Annual precipitation is somewhat higher than in the prairie region (averaging about 350-400 mm.) and temperatures are slightly lower. The parkland is a patchwork of open grasslands alternating with aspen groves, and dotted with small lakes and wetlands, these frequently surrounded by shrubby growth such as willows (*Salix* species) and gooseberry (*Ribes oxyacanthoides*). Climax grasslands are dominated by plains rough fescue (*Festuca hallii*), with minor components such as western porcupine grass (*Stipa curtiseta*), Hooker's oat grass (*Helictotrichon hookeri*) and awned wheat grass (*Agropyron trachycaulum* var. *unilaterale*). Wooded areas are a mixture of buckbrush (*Symphoricarpos occidentalis*) and aspen (*Populus tremuloides*) which, over time, develop an understory comprised of such species as bluejoint (*Calamagrostis canadensis*), awned wheat grass and Kentucky bluegrass (*Poa pratensis*). Encroachment of aspen onto the fescue grasslands is of primary concern to both ranchers and ecologists alike.

Also included as a somewhat transitional zone between the parkland and southern boreal forest is the rather unique Peace River district. It is typically warmer and drier than other regions at this latitude, being parkland-like with shrubby areas (saskatoon - *Amelanchier alnifolia* and wild cherries - *Prunus pensylvanica* and *virginiana*), aspen groves and open grasslands. Vegetation in the mesic grasslands includes needle grasses (*Stipa columbiana* and *viridula*), June grass (*Koeleria macrantha*) and wheat grasses (*Agropyron* species), while exposed and eroded slopes closely resemble drier portions of the parkland region.

Many range types occur throughout the parkland, the sandy Regosolic sites with a high sand grass (*Calamovilfa longifolia*) component, Solonetzic soils which are typically less productive, and saline depressional areas dominated by such species as Nuttall's alkali grass (*Puccinellia nuttalliana*), salt grass (*Distichlis stricta*) and alkali cord grass (*Spartina gracilis*).

3. The Foothills Ecoregion

The foothills region lies to the west of the prairies and intergrades into montane communities to the north and west. Soils are predominantly Black Chernozems in mesic grasslands, transitional into Dark Grey and Dark Grey Luvisols or Brunisols in wooded areas. Annual precipitation is relatively high, between 380 & 460 mm., and mean temperatures are lower than in the prairie and parkland regions. Grasslands in the foothills are characteristically our most diverse and complex, and vary significantly with microclimatic changes. As well, because moisture and soil conditions are usually favourable, rangelands are generally highly productive.

Mesic open sites are dominated by foothills rough fescue (*Festuca campestris*) with minor components such as Kentucky bluegrass (*Poa pratensis*), awned wheat grass (Agropyron *trachycaulum* var. *unilaterale*) and intermediate oat grass (*Danthonia intermedia*). On somewhat drier sites, Parry oat grass (*Danthonia parryi*) is often prominent, with Idaho fescue (*Festuca idahoensis*), June grass (*Koeleria macrantha*) and northern wheat grass (*Agropyron dasystachyum*) also increasing. On xeric, exposed sites the vegetation community will be composed of such species as bluebunch wheat grass (*Agropyron spicatum*), June grass and dryland sedges.

Shrub cover in much of the Ecoregion is significant, as is the encroachment of aspen (*Populus tremuloides*) on suitable sites. Early successional woody species include green alder (*Alnus crispa*), birch (*Betula* species), lodgepole pine (*Pinus contorta*), Scouler's willow (*Salix scouleriana*), and in some locations, Douglas Fir (*Pseudotsuga menziesii*). Old growth forests are dominated by white spruce (*Picea glauca*), with a rather sparse understory cover, including pine grass (*Calamagrostis rubescens*), hairy wild rye (*Elymus innovatus*), cranberry and blueberry (*Vaccinium* species), heart-leaved arnica (*Arnica cordifolia*) and bunchberry (*Cornus canadensis*).

The Cypress Hills is a disjunct fescue grassland situated in southeastern Alberta and southwestern Saskatchewan. It interrupts the prairie landscape by rising to an elevation of over 1300 m. Soils in the region are good, and increases in precipitation (to about 400 mm. or more annually) correlate with the higher elevation. The prairie vegetation on the lower slopes graduates into rough fescue grasslands (both *Festuca campestris* and *Festuca hallii* and also suspected hybrids between the two). Land forms are varied, consisting of rolling hills, terraces, numerous wetlands, ravines and shrubby thickets including such species as saskatoon (*Amelanchier alnifolia*), willows (*Salix* species) and hawthorn (both *Crataegus douglasii* and *rotundifolia*). Highest elevations and north facing slopes are dominated by tree cover, the aspen and lodgepole pine forests ultimately replaced by white spruce. Productivity, species composition and diversity are comparable to that of the foothills Ecoregion.

4. The Boreal Forest

The boreal forest is a vast, extensive area situated north of the parkland Ecoregion. The southern portion is transitional to the parkland, dominated by Grey, Dark Grey and Dark Grey Wooded Soils. Annual precipitation varies between 400 and 480 mm. This region characteristically has numerous wetlands where sedges (*Carex* species), cotton grasses (*Eriophorum* species), manna grasses (*Glyceria grandis* and *borealis*) and reed grasses (*Calamagrostis stricta* and *inexpansa*) are prominent.

Upland soils are predominantly Brunisols and Luvisols, and are often sandy in nature, supporting such woody species as green alder (*Alnus crispa*), aspen (*Populus tremuloides*) and Jack pine (*Pinus banksiana*). Understory vegetation includes short-awn rice grass (*Oryzopsis pungens*), awned and slender wheat grass (*Agropyron trachycaulum* var. *unilaterale* and var. *trachycaulum*) and blueberry (*Vaccinium myrtilloides*).

If left undisturbed, mesic sites are dominated by forests, cover values of individual species varying in response to changes in microclimate, aspect, slope and soils. Most common are aspen, balsam poplar, with paper birch (*Betula papyrifera*) and birch hybrids in some locations, and often white spruce at late successional phases. Understory shrubs include rose (*Rosa acicularis*), low-bush cranberry (*Viburnum edule*), alder, red osier dogwood (*Cornus stolonifera*) and occasionally hazelnut (*Corylus cornuta*).

The northern boreal forest can, as a whole, be classed as less productive rangeland. Soils are predominantly Grey Wooded, often with a high organic peat content. As well, annual precipitation in some portions is slightly higher and the major factor limiting vegetation growth is the colder atmospheric temperature. Early successional upland vegetation includes woody species such as aspen and balsam poplar (*Populus tremuloides* and *balsamifera*) and birch (*Betula* species), this in time replaced by white spruce (*Picea glauca*) in climax forests. Subxeric, sandy sites occur, combining Jack pine, aspen, and blueberry communities, and grass species such as short-awn rice grass, hairy wild rye (*Elymus innovatus*) and sheep fescue (*Festuca saximontana*).

Throughout the boreal forest, extensive and significant areas are covered by wetlands. At one end of the spectrum are true bogs, characterized by having little or no water movement, and acidic, nutrient-poor soils. Productivity and species richness on these sites is minimal, seen at the tree/shrub level and also with herbaceous graminoid and forb species. Typical components include Labrador tea (*Ledum groenlandicum*), peat (*Sphagnum* species), cloudberry (*Rubus chamaemorus*) and black spruce (*Picea mariana*). Also prevalent are fens and marshes which show improved soil nutrients, hence higher productivity and biodiversity. Shrub/tree cover is often increased, with the inclusion of tamarack (*Larix laricina*), and on superior sites, additions of or replacement of small bog willows (*Salix pedicellaris*) by larger species (*Salix lucida*, *planifolia*, *pyrifolia*). Prominence of sedges is frequently high, common species including (*Carex lasiocarpa*, *Carex aquatilis*, *Carex prairea*, *Carex diandra*, and with increased water movement, *Carex rostrata*.

5. The Montane Ecoregion

To the west of the foothills, but below subalpine elevations, lies the montane Ecoregion, characterized by a pattern of forests, wetlands and grasslands. Included here are the familiar river valleys that follow the mountain passes, these more confined and narrow in the north, becoming rather extensive and significant southward. Precipitation in these regions is considerable, as is Chinook activity in southern areas that periodically allows for intermittently low snow cover. Soils are predominantly Brunisols, Grey Luvisols, Regosols, transitional to Chernozems in open grasslands and eastward into the foothills.

From a rangeland perspective, the montane region is at times underrated, lumped with the subalpine which typically has lower growing, more sparse vegetation cover as a result of poorly developed, shallow soils and severe climatic limitations. By contrast, productivity and the consequent potential to support a wide diversity of life forms often equals that of the foothills region.

Driest sites occur on rocky, exposed slopes, and typical species include kinnikinnick (*Arctostaphylos uva-ursi*), hairy wild rye (*Elymus innovatus*), and tree cover is limited to a few limber pine (*Pinus flexilis*), with lodgepole pine (*Pinus contorta*), Douglas fir (*Pseudotsuga menziesii*) and Canadian buffalo-berry (*Shepherdia canadensis*) on somewhat better sites. Mesic grasslands are dominated by rough fescue (*Festuca campestris/altaica*) with Parry oat grass (*Danthonia parryi*) and bluebunch wheat grass (*Agropyron spicatum*) on drier upper slopes, and Richardson needle grass (*Stipa richardsonii*) along lower river terraces.

Forest cover on many upland sites is significant, due, at least in part, to lack of fire in recent years. Mixedwood communities are dominated by alder (*Alnus crispa*), willow (*Salix glauca, bebbiana, scouleriana*) and aspen (*Populus tremuloides*), successional to lodgepole pine and white spruce (*Picea glauca*). Understory species vary both with region and moisture regime, often including spiraea (*Spiraea betulifolia*), showy aster (*Aster conspicuus*), thimbleberry (*Rubus parriflorus*).

Wetlands are scattered throughout the region, typical species including birch (*Betula* species), willow (*Salix* species), horsetail (*Equisetum* species) and usually high cover of sedges (*Carex* species). Productivity on both the shrub and herbaceous layer is generally favourable, usually sustaining large populations of wild ungulates.

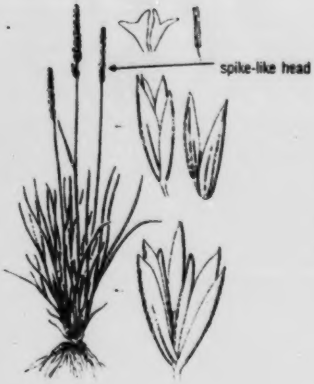
However important they may be to the well-being of the wildlife population and to the ecosystem as a whole, it is not the grasses or woody species that leave a lasting impression on the casual observer. It is, rather, the seemingly endless numbers of montane forbs, and the varied species compositions that change both with the seasons and from one ecosite to the next, and ultimately create a landscape unequalled elsewhere for its beauty.

> "The quawmash is now in blume and from the colour of its bloom at a short distance it resembles lakes of fine, clear water, so complete in this deseption that on first sight I could have swoarn it was water."
>
> Meriwether Lewis, from *Original Journals of the Lewis and Clark Expidition.* June 12, 1806.

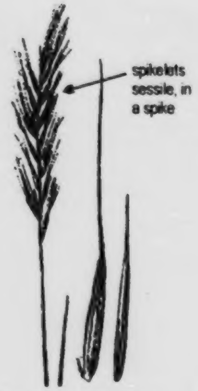
Grasses & Grass-Like Species

Comparison of Grasses and Grass-Like Species

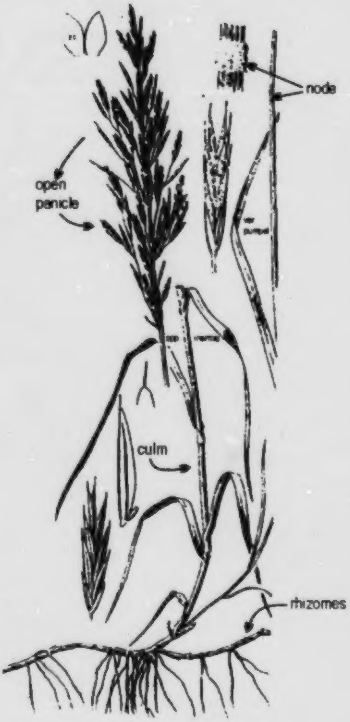
	Gramineae Grasses	Cyperaceae Sedges	Juncaceae Rushes
Culms:	Mostly hollow, rounded to flattened; nodes conspicuous.	Solid (pith filled), usually 3-sided; nodes indistinct.	Solid (with sponge-like pith), rounded; nodes indistinct.
Blades:	2-ranked, usually flat, sometimes folded, involute or bristle-like; margins variable.	3-ranked, sometimes reduced, usually hairless; margins roughened.	3-ranked (sometimes reduced), terete to flat; mostly hairless, margins smooth.
Sheaths:	Usually split, sometimes closed.	Closed.	Open or closed.
Ligules:	Usually present and greatly varying.	Absent or weakly developed, not greatly varying.	Absent or weakly developed, not greatly varying.
Collars:	Usually distinct, varying.	Indistinct.	Indistinct.
Auricles:	Present or absent.	Absent.	Absent.
Heads:	Flowers mostly perfect, bracts 2-ranked; lowest 2 bracts (glumes) empty, upper mostly with 2 bracts (palea and lemma); perianth lacking or of inconspicuous scales (lodicules); fruit a grain (caryopsis).	Flowers often imperfect; bracts 1 per flower; perianth of scales, bristles, or lacking; fruit a flattened or 3-sided achene.	Flowers perfect, perianth present as 2 similar whorls, each with 3 segments; fruit a capsule, seeds 3-many.


spike-like head

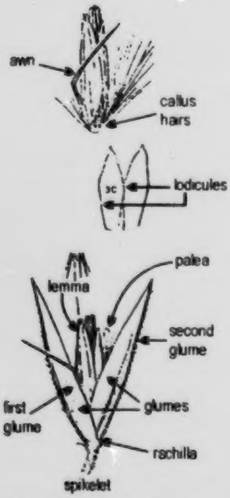
Koeleria macrantha


spikelets sessile, in a spike

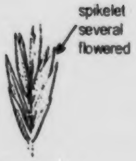
Agropyron trachycaulum var *unilaterale*


node
open panicle
culm
rhizomes

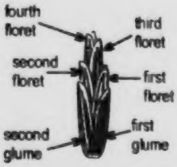
Bromus inermis


awn
callus hairs
lodicules
palea
lemma
second glume
first glume
glumes
rachilla
spikelet

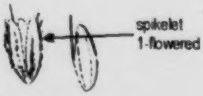
Calamagrostis montanensis


spikelet several flowered

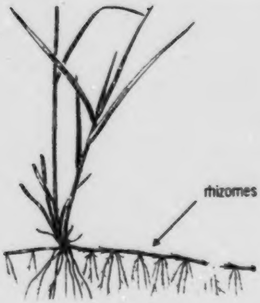
Agropyron repens


fourth floret
third floret
second floret
first floret
second glume
first glume

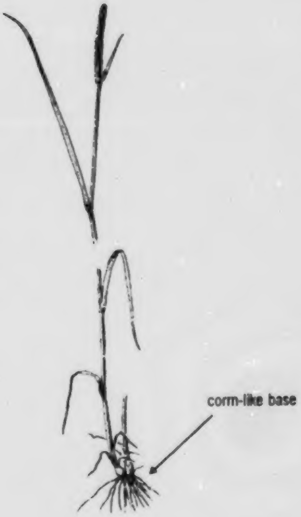
Agropyron intermedium


spikelet 1-flowered

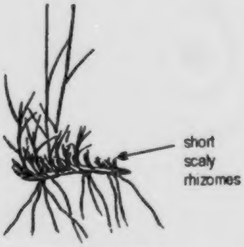
Alopecurus aequalis



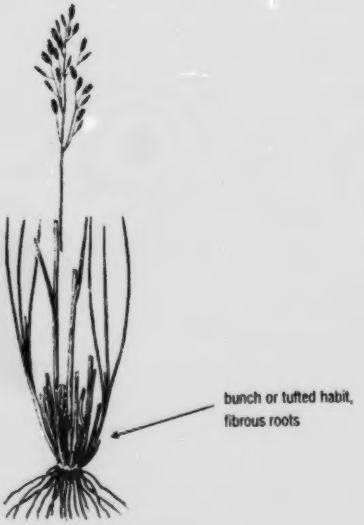
Agropyron repens


corm-like base

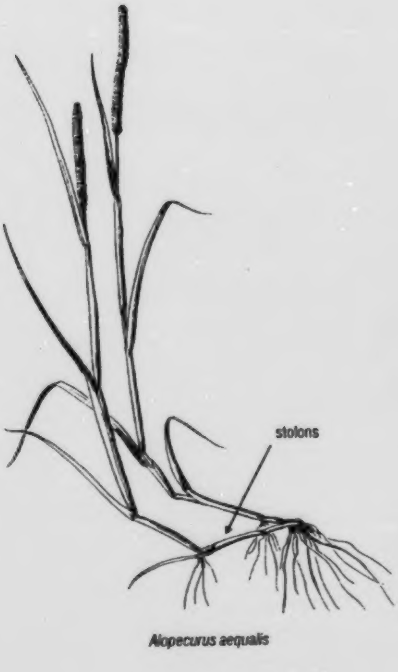
Phleum pratense


short
scaly
rhizomes

Bouteloua gracilis


bunch or tufted habit,
fibrous roots

Festuca campestris



Alopecurus aequalis

Division SPERMATOPHYTA - Seed Plants

Subdivision Angiospermae - Flowering Plants

Class MONOCOTYLEDONEAE - Monocotyledons

1. Ovules more than 1; perianth dry; flowers in dry heads or in lateral clusters or at ends of branches. *Juncaceae*

   Ovary, locule and ovule each 1. 2

2. Stems mostly hollow, terete; leaves 2-ranked; lowest 2 glumes empty, upper subtended by palea and lemma; perianth lacking or inconspicuous (lodicules); fruit a grain (caryopsis). *Gramineae*

   Stems solid, usually 3-sided; leaves 3-ranked; flowers often imperfect, bracts 1 per flower; perianth of scales, bristles, or lacking; fruit a flattened or 3-sided achene. *Cyperaceae*

GRAMINEAE - Grass Family

Common Characteristics

- Annual to perennial herbs with fibrous roots or rhizomes, sometimes also stoloniferous.
- Stems solid at the nodes, otherwise mostly hollow, rounded (sometimes flat) in cross-section.
- Leaves 2-ranked (borne on 2 sides of the stem).
- Leaves consisting of a basal portion (sheath) that envelopes the stem, and a blade.
- Leaves with parallel veins, stalkless, linear, flat to inrolled.
- Ligule present at the junction of sheath and blade, this usually membranous, sometimes a fringe of hairs, rarely obsolete.
- Inflorescence of spikes, racemes, or compound and in panicles.
- Flowers in groups (spikelets), each 1-several flowered.
- Spikelets with 2-ranked bracts, the two lowest (glumes) without flowers, the upper with a pair of bracts, the lemma and palea (this absent in a few species) below each flower.
- Flowers usually perfect, occasionally unisexual, without conspicuous perianth, this sometimes present as small scales (lodicules).
- Stamens mostly 3; ovary 1-celled, with 2 styles and feathery stigmas.
- Fruit a grain (caryopsis), this sometimes contained within the lemma and palea.

Vegetative Grass Key

1.	Species of wet habitats, with inundation or (at least partial) soil saturation normal for part or most of the year.	2
	Upland species, habitats varying from xeric to mesic, with soil not wet for extended periods under normal climatic conditions.	34
2.	Rhizomes present.	3
	Rhizomes absent (stolons present in some species).	24
3.	Auricles present (sometimes small or only one visible).	4
	Auricles absent.	7
4.	Plants to 6 dm. tall, blue-glaucous; auricles purple-tinged; leaves stiff, angled from stems at about 45°.	*Agropyron smithii*
	Plants not blue-glaucous and with purple auricles.	5
5.	Tall tufted, coarse plants mostly 1-3 m. tall; rhizomes short, thick or sometimes rudimentary.	6
	Rhizomes elongate, plants 5-10 dm. tall; leaves glossy and smooth below, bright green; introduced.	*Festuca pratensis*
6.	Plants 2-3 m. tall; leaves to 15 mm. wide; ligules; 3-7 mm. long; blades rough below; auricles not ciliate; native.	*Elymus piperi*
	Plants to or just over 1 m. tall; leaves mostly not over 10 mm. wide; ligules to 0.2 mm. long; blades rough below; auricles ciliate; introduced.	*Festuca elatior* var. *arundinacea*
7.	Ligule a ring of hairs.	8
	Ligules membranous.	10
8.	Large reed-like plants 1.5-3 m. tall; leaves to 3 cm. wide, veins not conspicuous; boreal species.	*Phragmites australis*
	Smaller plants, less than 1 m. tall; leaves to 5 mm. wide; species of saline/alkaline habitats.	9
9.	Emerging leaves folded, to 4 mm. wide and 15 cm. long, the lower short, few, overlapping; sheath margins scarious; small plants to 4 dm. tall.	*Distichlis stricta*
	Emerging leaves rolled, to 5 mm. wide and 40 cm. long, the basal not shorter; taller plants 3-6 dm. tall.	*Spartina gracilis*

10. Leaves with boat-shaped tips. 11

Leaves with pointed tips. 13

11. Ligules 5-10 mm. long, blades paler above and also finely warty-roughened above. *Glyceria borealis*

Ligules to 5 mm. long, blades not distinctly paler above/warty-roughened. 12

12. Blades to 15 mm. wide; blades and sheaths conspicuously cross-veined (muriform); ligules to 4 mm. long; large plants 10-15 dm. tall. *Glyceria grandis*

Blades 2-4 mm. wide; blades and sheaths not conspicuously muriform; ligules to 5 mm. long, hairy on the back; smaller plants 3-8 dm. tall. *Glyceria striata*

13. Robust plants to 15 dm. tall; rhizomes stout, long, scaly, pink-tinged; plants often pink at base; blades to 15 mm. wide. *Phalaris arundinacea*

Rhizomes thinner, plants less robust; mostly less than 15 dm. tall; blades to 10 mm. wide. 14

14. Plants aquatic, or stoloniferous on muddy shores when water levels recede; blades soft and flat; ligules to 8 mm. long. *Catabrosa aquatica*

Plants normally not aquatic. 15

15. Emerging leaves folded; blades to 2 mm. wide, or plants of fens/bogs if broader. 16

Emerging leaves rolled; blades mostly more than 2 mm. wide. 18

16. Bog/fen plants from hard, scaly rhizomes; leaves flat, to 5 mm. wide. *Muhlenbergia glomerata*

Plants not of bogs/fens; leaves narrower. 17

17. Plants rather loosely tufted; blades crowded, stiff, rough below, to 5 cm. long; ligules to 1 mm. long; prairie species of moist alkaline sites. *Muhlenbergia asperifolia*

Plants densely tufted, mat forming; blades fine, blue-green, not crowded, smooth below, to 10 cm. long; ligules prominent, 1-3 mm. long; widespread. *Muhlenbergia richardsonis*

18.	Blades of two types, those of sterile shoots long, curved, pointed, those of fertile stems only to 3 cm. long, with boat-shaped tips; foliage with sweet alfalfa-like odor; collars with short, fine pubescence.	*Hierochloe odorata*
	Blades all similar, plants without distinctive odor.	19
19.	Leaves usually over 5 mm. broad.	20
	Leaves usually averaging less than 5 mm. broad.	23
20.	Leaves often to 10 mm. broad; ligules over 4 mm. long, lacerate.	21
	Leaves to 8 mm. broad; ligules to 3 mm. long, mostly entire.	22
21.	Rhizomes stout, fleshy; basal sheaths purple-tinged; ligules to 8 mm. long.	*Scolochloa festucacea*
	Rhizomes slender, not fleshy; basal sheaths pale-yellowish; ligules to 5 mm. long.	*Calamagrostis canadensis*
22.	Foliage blue-green; leaves 3-6 mm. wide; native.	*Alopecurus occidentalis*
	Foliage not blue-green; leaves to 8 mm. wide; introduced.	*Alopecurus arundinaceus*
23.	Blades firm, roughened above; ligules conspicuous, 4-7 mm. long, slightly lacerate.	*Calamagrostis inexpansa*
	Blades more lax, roughened on tips, margins, sometimes slightly above; ligules inconspicuous, 1-2 mm. long, more distinctly lacerate.	*Calamagrostis stricta*
24.	Leaves with boat-shaped tips, 1-2 mm. wide.	25
	Leaves without boat-shaped tips.	27
25.	Plants often reclining at the base and stoloniferous; bases purple-tinged; leaves lax; ligules 1-4 mm. long; not of saline/alkaline sites.	*Poa palustris*
	Plants erect, without stolons, often of saline/alkaline sites.	26
26.	Ligules truncate, not more than 1 mm. long on lower parts of the plant; plants 5-10 dm. tall, pale green/glaucous, bases yellowish to light pink.	*Poa juncifolia*
	Ligules pointed, to 5 mm. long; plants to 4 dm. tall; foliage green/blue-green, bases often purple-tinged.	*Poa canbyi*

27. Emerging leaves folded; blades to 5 mm. wide, veins prominent, paler between veins; blades rough; ligules conspicuous, to 10 mm. long. *Deschampsia caespitosa*

Emerging leaves rolled; remaining characteristics not present in combination. 28

28. Ligules conspicuous, mostly more than 3 mm. long. 29

Ligules short, less than 3 mm. long; auricles small, rudimentary or sometimes absent. 33

29. Blades mostly over 5 mm. wide. 30

Blades 5 mm. wide or less. 31

30. Plants sometimes annual, not stoloniferous; blades to 12 mm. wide; sheaths muriform. *Beckmannia syzigachne*

Perennials, often reclining at base and forming stolons; blades to 8 mm. wide; sheaths not muriform, often purplish at base. *Agrostis stolonifera*

31. Annuals to perennials; leaves dull green, distinctly veined; ligules 4-8 mm. long. *Alopecurus aequalis*

Perennials, veins not conspicuous; ligules to 5 mm. long. 32

32. Blades flat, 2-5 mm. long; ligules 1.5-4 mm. long; plants not of saline/alkaline sites. *Sphenopholis obtusata*

Blades to 3 mm. wide, flat to involute; ligules to 5 mm. long; plants of saline/alkaline habitats. *Puccinellia nuttalliana*

33. Blades soft, pale blue/grey-green, upper surface rough hairy, the lower surface and sheaths soft hairy. *Hordeum jubatum*

Blades not soft hairy below, firm; sheaths often with some hairs below. *Agrohordeum macounii*

34. Rhizomes present. 35

Rhizomes absent. 70

35. Auricles present. 36

Auricles absent. 48

36. Tall coarse plants 1-3 m. tall; blades 10-15 mm. wide; rhizomes short; plants tufted. 37

Smaller plants less than 1 m. tall. 38

37. Plants 2-3 m. tall; leaves to 15 mm. wide; ligules 3-7 mm. long; auricles not ciliate; native. *Elymus piperi*

Plants about 1 m. tall; leaves about 10 mm. wide; ligules to 0.2 mm. long; auricles ciliate; introduced. *Festuca elatior* var. *arundinacea*

38. Plants blue-glaucous, auricles purple-tinged; leaves stiff, angled from stems at about 45 degrees. *Agropyron smithii*

Plants not both glaucous and with purple-tinged auricles. 39

39. Leaves and/or sheaths with conspicuous pubescence. 40

Leaf and sheath pubescence inconspicuous or plants glabrous. 44

40. Pubescence more evident on leaf/sheath margins; introduced. 42

Pubescence more evident across at least one leaf surface and/or on sheaths. 41

41. Leaf hairs rather evenly distributed on both leaf surfaces and sheaths; auricles small; native. *Bromus pumpellianus*

Leaf hairs most evident on upper leaf surface and lower sheaths; auricles well developed; introduced. *Agropyron repens*

42. Fringe of hairs on leaf margins long and fine; leaves medium green. *Bromus biebersteinii*

Fringe of hairs on leaf/sheath margins short and stiffer; leaves light green. 43

43. Leaves mostly glabrous on surfaces. *Agropyron intermedium*

Leaves with some pubescence on surfaces. *Agropyron trichophorum*

44. Blades less than 10 mm. wide. 45

Blades more than 10 mm. wide. 46

45. Rhizomes rather few; blades to 8 mm. wide, lax, shiny, smooth, bright green below; introduced. *Festuca elatior*

Rhizomes well developed; blades to 6 mm. wide, often involute, stiff, light to bluish-green; native. *Agropyron dasystachyum*

46. Rhizomes short, often absent; blades 4-20 mm. wide; most common in prairie/parkland regions on light soil. *Elymus canadensis*

Rhizomes elongate and always evident; blades no more than 12 mm. wide. 47

47. Plants tufted; from rhizomes; leaves 1-4 mm. wide. *Agroelymus hirtiflorus*

Plants rarely tufted; blades to 12 mm. wide; blue/yellow-green below, glaucous above. *Elymus innovatus*

48. Blades with boat-shaped tips. 49

Blades with pointed tips. 52

49. Blades of two types, those of sterile shoots long, curved, pointed, those of fertile stems only to 3 cm. long, with boat-shaped tips; foliage with sweet alfalfa-like odor; collars with short, fine pubescence. *Hierochloe odorata*

Blades all similar; plants without distinctive odor. 50

50. Foliage blue-green, wiry, stiff; sheaths sharply keeled and flattened (culms flattened); collar divided. *Poa compressa*

Foliage not both blue-green and wiry; sheaths often somewhat but not strongly flattened/keeled. 51

51. Ligules 1-4 mm. long, pointed and entire; prairie species of sandy, sometimes saline sites. *Poa arida*

Ligules truncate, to 1 mm. long; widespread species of mesic, fertile sites. *Poa pratensis*

52. Blades averaging more than 10 mm. wide. 53

Blades averaging less than 10 mm. wide.

53. Sheaths closed to near top. 54

Sheaths split. 55

54. Midrib of blades not extending down sheath to split collar; blades and sheaths with no pubescence (some hairs present in hybrids with *B. pumpellianus*); ligules to 1 mm. long; introduced. *Bromus inermis*

Midrib of blades extending down sheath to split collar; blades and sheaths pubescent; ligules 1-2 (3) mm. long; native. *Bromus pumpellianus*

55. Plants sometimes bulbous at base; blades flat, rough above and below; ligules to 10 mm. long; collars dark purple-brown; woodland species. *Cinna latifolia*

Plant bases not bulbous; other characteristics not present in combination. 56

56. Ligule a fringe of hairs. 57

Ligule membranous. 58

57. Rhizomes long, stout, scaly; leaves to 12 mm. wide and 50 cm. long; tall plants of sandy places. *Calamovilfa longifolia*

Rhizomes short, scaly, plants forming mats; leaves to 8 mm. wide and 15 cm. long; small tufted prairie species. *Bouteloua gracilis*

58. Rhizomes short, plants tufted. 59

Rhizomes elongate, plants not tufted. 62

59. Mat forming plants; blades light green/glaucous, red-tinged, with a thick vein along margins; blades constricted at the base; sheaths purplish, collars purplish, constricted on margins. *Schizachyrium scoparium*

Plants without above combination of characteristics. 60

60. Woodland species; blades dark green, flat, rough below; blades of fertile stems short (to 1 cm.), basal to 40 cm. long, to 10 mm. broad; basal sheaths dark purple; ligules to 1 mm. long. *Oryzopsis asperifolia*

Grassland species; stem leaves not distinctly shorter. 61

61. Densely tufted plants forming short rhizomes; blades blue/grey green, rolled, rough above and below; lower sheaths purple, persistent, not readily shredded; native prairie/parkland species. *Festuca hallii*

Loosely tufted plants; blades dark green, smooth, at least below; lower sheaths red-brown, readily shredded; introduced in all but driest regions. *Festuca rubra*

62. Blades of two types, those of sterile shoots long, curved, pointed, those of fertile shoots only to 3 cm. long, with boat-shaped tips; foliage with sweet alfalfa-like odor; collars with short, fine pubescence. *Hierochloe odorata*

Blades all similar, plants without distinctive odor. 63

63. Emerging leaves folded; blades to 2 mm. wide, blue-green; plants densely tufted and mat forming; ligules prominent, 1-3 mm. long; usually in depressional sites. *Muhlenbergia richardsonis*

Emerging leaves rolled; blades over 2 mm. wide. 64

64. Blades averaging less than 5 mm. wide, or if more than 5 mm., then short (to 15 cm.) and plants small (1.5-5 dm.), of wooded regions. 65

Blades averaging more than 5 mm. wide. 67

65. Small woodland plants 1.5-5 dm. tall, tufted and often with short rhizomes; blades only to 15 cm. long, flat, 4-7 mm. wide. *Phleum commutatum*

Rhizomes elongate. 66

66. Woodland plants of the Rocky Mountain region; collar and sheath margins distinctly pubescent; ligules 1-4 mm. long. *Calamagrostis rubescens*

Widespread species of open places; collars and sheaths glabrous; ligules conspicuous, pointed, to 7 mm. long; foliage usually blue-tinged. *Calamagrostis montanensis*

67. Woodland plants; sheaths closed at first, then split; lower sheaths purplish; blades dark green, rough at least above; ligules to 1 mm. long. *Schizachne purpurascens*

Habitat variable; sheaths split; other characteristics not present in combination; ligules usually over 1 mm. long. 68

68. Blades lax, to 10 mm. wide; collar glabrous and pale coloured; basal sheaths pale-yellowish; ligules to 5 mm. long. *Calamagrostis canadensis*

Blades averaging less than 10 mm. wide. 69

69. Foliage blue-green; leaves 3-6 mm. wide; native. *Alopecurus occidentalis*

Foliage not blue-green; leaves to 8 mm. wide; introduced. *Alopecurus arundinaceus*

70. Auricles present. 71

Auricles absent. 81

71. Blades averaging more than 10 mm. wide. 72

Blades averaging less than 10 mm. wide. 74

72. Large grasses 2-3 m. tall; leaves firm, to 40 cm. long, smooth below; introduced. *Elymus angustus*

Smaller grasses to 12 dm. tall; native. 73

73. Blades glaucous, lax, to 15 mm. wide; collars narrow; auricles to 4 mm. long; a species of forested regions, primarily of western foothills and montane areas. *Elymus glaucus*

74. Leaves nearly always less than 5 mm. wide. 75

Leaves, at least some, 5-10 mm. wide. 79

75.	Auricles conspicuous, clawlike, to 2 mm. long; introduced.	*Elymus junceus*
	Auricles small, sometimes rudimentary.	76
76.	Plants of dry places; blades to 3 mm. wide, with a thick white vein on margins and midrib; basal sheaths purplish.	*Sitanion hystrix*
	Thick white vein on midrib and margins absent.	77
77.	Ligules very short, to 0.5 mm. long; foliage often blue-green; base of plant brownish; of dry habitats.	*Agropyron spicatum*
	Ligules to 1 mm. long; foliage not blue-green; base of plants purplish.	78
78.	Small plants 2-5 dm. tall; one auricle often larger; plants of Rocky Mountain/northern regions.	*Agropyron violaceum*
	Larger plants 5-10 dm. tall; auricles both small; widespread.	*Agrohordeum macounii*
79.	Tall introduced plants to 2 m. tall.	*Agropyron elongatum*
	Native plants (introduced varieties of *A. trachycaulum* sometimes found); plants mostly not more than 15 dm. tall; one auricle usually longer.	80
80.	Lower sheaths and leaves soft-hairy, at least new growth; foliage pale to blue-green; plant bases brownish to pinkish.	*Agropyron subsecundum*
	Lower sheaths and leaves mostly glabrous (in natives); foliage medium green; plant bases pink-purplish.	*Agropyron trachycaulum*
81.	Ligule a ring of hairs.	82
	Ligule membranous.	88
82.	Culms solid or pith filled; emerging leaves rolled.	83
	Culms hollow; emerging leaves folded (rolled in *Aristada*).	84
83.	Small mat forming plants 1-4 dm. tall, sometimes with short rhizomes; leaves short (to 15 cm. long), 1-2 mm. wide, curled; collar hairs not long-spreading.	*Bouteloua gracilis*
	Taller plants (3-8 dm.), rhizomes absent; plants reclining at base, leaves ascending at about 45 degrees, to 5 mm. wide and 20 cm. long; upper part of sheaths hair-fringed; collar hairs long, spreading; of sandy sites.	*Sporobolus cryptandrus*

84. Leaves scabrous, very narrow, bristle-like, curled; sheaths veiny, often with ascending prickly hairs; emerging leaves rolled; uncommon, dry prairie sites. *Aristida longiseta*

Plants without above combinations of characteristics; emerging leaves folded. 85

85. Ligules very short, to 0.5 mm. long; lower leaf surface more hairy than the upper; common in moist grassland. *Danthonia intermedia*

Ligules longer, over 0.5 mm. long; leaf hairs, when present, more prevalent on upper leaf surface. 86

86. Sheaths and collars essentially glabrous; leaves mostly glabrous (a few hairs above), narrow, curled and pale at maturity; blades readily detach, leaving conspicuous, persistent pale sheaths; densely tufted plants of southern foothills/ montane, upland sites; common. *Danthonia parryi*

Collars and/or sheaths with at least some conspicuous hairs; uncommon, often in depressional grassland. 87

87. Culms mostly over 3 dm. tall; at least some sheaths or leaves often with rather sparse hairs; found in depressional grassland. *Danthonia californica*

Culms to 3 dm. tall; plants strongly hairy throughout, collar hairs essentially long and reflexed; found on dry ridges in western regions, in depressional prairie grassland. *Danthonia unispicata*

88. Leaves with boat-shaped tips. 89

Leaves with pointed tips. 98

89. New growth/sheaths distinctly flattened and keeled; leaves 5 mm. wide or more. 90

New growth not compressed-keeled (may be somewhat flattened); leaves mostly 5 mm. wide or less. 91

90. Blades to 10 mm. wide, pale green-glaucous, veiny, margins and midrib without white nerve; ligules to 8 mm. long; introduced. *Dactylis glomerata*

Blades to 5 mm. wide, pale green to blue, with a white nerve on margins and midrib; ligules to 5 mm. long; native. *Helictotrichon hookeri*

91. Plants reclining at the base, usually stoloniferous; blades lax, to 4 mm. wide; ligules to 4 mm. long; mostly of moist habitats. *Poa palustris*

Plants not stoloniferous, mostly erect. 92

92. Ligules mostly truncate and not more than 1 mm. long on lower parts of the plant (upper ligules may be 2 mm. long). 93

Ligules pointed or over 2 mm. long on lower parts of the plant. 95

93. Plants 2-5 dm. tall, never producing rhizomes, rather fine; blades 1-2 mm. wide; lax; base purplish; ligules truncate, lowest to 1 mm. long; widespread. *Poa interior*

More robust plants 5-12 dm. tall, sometimes producing short rhizomes; bases pale to pink-tinged; blades pale-glaucous to blue-green. 94

94. Plants of moist often alkaline sites, 5-10 dm. tall; leaves to 1.5 mm. wide, mostly inrolled. *Poa juncifolia*

Plants forming large bunches on upland montane/foothills areas, to 12 dm. tall; leaves to 3 mm. wide. *Poa ampla*

95. Small alpine/montane plants; blades short (to 5 cm.), flat, 2-4 mm. wide, blue-green. *Poa alpina*

Blades narrower, distribution variable. 96

96. Rather stiff, wiry, glaucous plants, often on dry ridges; ligules 1-2 mm. long. *Poa glauca*

Plants not wiry; ligules mostly over 2 mm. long. 97

97. Plants to 4 dm. tall; blades to 4 mm. wide and 20 cm. long; mostly smooth below; ligules to 5 mm. long; of depressional, often saline habitats. *Poa canbyi*

Plants to 3 dm. tall; leaves short (4-12 cm.) and fine (to 2 mm. wide), twisted-curled at tips; foliage at first glaucous, then tawny-pale; ligules to 3 mm. long; mostly upland species, sometimes on clay flats, in blow-outs. *Poa sandbergii*

98. Sheaths closed, their margins not overlapping; *Bromus*. 99

Sheaths open/split, their margins usually overlapping. 104

99. Weedy annuals, leaves and sheaths hairy; introduced. 100

Perennials, natives. 102

100. Ligules glabrous, to 3 mm. long. *Bromus tectorum*

Ligules hairy, to 1.5 mm. long. 101

101. Culms erect, to 3 dm. tall. *Bromus squarrosus*

Culms erect or bent at the base, 2-6 dm. tall. *Bromus japonicus*

102. Robust plants 6-12 dm. tall; leaves flat, often nearly 10 mm. wide, ligules 1-3 mm. long. *Bromus carinatus*

Plants at most 10 dm. tall; leaves 4-10 mm. wide, ligules about 1 mm. long. 103

103. Plants to 6 dm. tall; foliage dark green, leaves to 4 mm. wide. *Bromus anomalus*

Plants averaging taller, 5-10 dm; leaves green to yellow-green, mostly 5-10 mm. wide. *Bromus ciliatus*

104. Blades twisted-wavy, to 2 mm. wide and 2-5 cm. long, with a thick white nerve on the midrib and margin; sheaths compressed, with a white keel. *Schedonnardus paniculatus*

Blades not as above, if white nerve present, then not twisted-wavy; sheaths not compressed. 105

105. Annuals (native), leaves filiform, to 10 cm. long; plants purple-tinged below. *Vulpia octoflora*

Perennials. 106

106. Densely tufted plants of very dry sites, with hardened, bulbous scaly bases; culms solid, wiry; collars nodulose-hardened. *Muhlenbergia cuspidata*

Plants without both nodulose collars and hardened, bulbous bases. 107

107. Emerging leaves folded. 108

Emerging leaves rolled. 112

108. Plants to 5 dm. tall; leaves soft, to 4 mm. wide, short (to 12 cm.), blue-green, the tips somewhat but inconspicuously boat-shaped; leaves and sheaths often with small shiny hairs; basal sheaths pale, slightly swollen at the crown; ligules to 1 mm. long. *Koeleria macrantha*

Plants larger, or if small (to 5 dm.) then leaves short, (to 15 cm.) and filiform (to 1 mm. wide), and ligules less than 0.5 mm. long. 109

109. Ligules to 1 mm. long; blue-green plants 3-10 dm. tall; leaves rough, hair-like (to 2 mm. wide), 5-25 cm. long; basal sheaths pinkish; southern foothills/montane species. *Festuca idahoensis*

Ligules to 0.5 mm. long; blades not both blue-green and filiform. 110

110. Rather fine, small plants to 5 dm. tall; leaves fine, mostly green, 5-15 cm. long and to 1 mm. wide, rough; ligules less than 0.5 mm. long; plants tawny at base; widespread on all but poorest soils. *Festuca saxtmontana*

Plants of western regions, 3-10 dm. tall, leaves longer, wider. 111

111. Plants 3-10 dm. tall; blades grey-green, inrolled, 2-4 mm. wide; plants with conspicuous, purplish basal sheaths; found in foothills grassland. *Festuca campestris*

Plants 3-8 dm. tall; blades yellow-green to dark green, 1-3 mm. wide, often flat; basal sheaths sometimes pink-tinged; Rocky Mountain species. *Festuca altaica*

112. Ligules conspicuous, mostly more than 3 mm. long. 113

Ligules inconspicuous, less than 3 mm. long. 114

113. Plants of exposed/sandy places; blades long (to 50 cm.), inrolled, firm; ligules very conspicuous, to 8 mm. long; basal sheaths purple-tinged. *Oryzopsis hymenoides*

Prairie species; blades to 30 cm. long, flat to rolled; ligules to 5 mm. long, pointed, often split off-centre; basal sheaths pale, slightly swollen-twisted at crown. *Stipa comata*

114. Collars and sheaths with tufts of long hairs at margins; leaves dark green, numerous, to 5 mm. wide. *Stipa viridula*

Collars and sheaths without long hairs at margins (sheaths/collars may have hairs, but not in tufts at margins). 115

115. Leaves often over 10 mm. wide. 116

Leaves less than 10 mm. wide. 117

116. Plants with bulbous, corm-like bases, basal sheaths brownish, shredded; leaves succulent, glaucous to light green; ligules to 3 mm. long; introduced. *Phleum pratense*

Bulbous corm-like bases absent, short rhizomes sometimes present; basal leaves spreading, rough below, mostly smooth above; stem leaves much shorter (to 1 cm. long); foliage dark green, plant bases purple; ligules to 0.5 mm. long; native woodland species. *Oryzopsis asperifolia*

117. Sheaths and blades glabrous to pubescent, blades with thickened white margins and midvein; basal sheaths purplish; ligules to 1 mm. long; auricles often evident; mostly on dry sites. *Sitanion hystrix*

Auricles mostly absent (collar may have thickened margins in *Hordeum jubatum*). 118

118. Blades soft, pale blue-grey-green, upper surface rough hairy, the lower surface and sheaths soft hairy; ligules to 1 mm. long; weedy natives often in depressional areas. *Hordeum jubatum*

Plants, if conspicuously pubescent, with ligules to 2 mm. long. 119

119. Ligules to 1 mm. long. 120

Ligules between 1 and 2 mm. long. 122

120. Basal portion of plants tawny, somewhat flattened/swollen and twisted at crown; leaves 1-3 mm. wide and bristle-like at maturity; ligules to 0.5 mm. long, slightly emarginate, not ciliate; auricles absent; common foothills/montane species. *Stipa richardsonii*

Blades not bristle-like at maturity; ligules to 1 mm. long, ciliate, not emarginate; lower sheaths often purplish; plants not swollen-twisted at crown. 121

121. Leaves and sheaths often finely hairy; leaves to 3 mm. wide, with thickened white margins and midvein; mostly of dry places. *Sitanion hystrix*

Leaves and sheaths mostly glabrous; leaves to 5 mm. wide, without white midvein and margin; usually of moist places. *Agrohordeum macounii*

122. Leaves glabrous, hair-like, short, to 2 mm. wide, inrolled at maturity; ligules to 5 mm. long, hairy outside, often lacerate, not ciliate; weedy natives. *Agrostis scabra*

Leaves to 5 mm. wide, not hair-like; ligules to 2 mm. long, ciliate at apex. 123

123. Plants 1-5 dm. tall; leaves to 5 mm. wide, flat to rolled; plants usually with conspicuous hairs on sheaths and blades; crowns not swollen-twisted; of forested areas in the foothills/montane and boreal regions. *Trisetum spicatum*

Larger plants 4-6 dm. tall; leaves long-pointed, pubescence, if any, fine and inconspicuous; plants slightly swollen-twisted at crown. 124

124. Leaves to 5 mm. wide, flat to rolled, light green; ligules often notched/split in centre. *Stipa curtiseta*

Leaves to 3 mm. wide, mostly rolled, tips often red-tinged; ligules often slightly emarginate, not notched/split in centre. *Stipa columbiana*

Grass Key - To Tribes

1. Spikelets 1-many flowered; sterile florets (if any) above perfect, or, in *Phalarideae*, 2 sterile florets below fertile; articulation mostly above glumes (spikelets laterally compressed). 2
Subfamily *Festucoideae*

Spikelets 2-flowered with 1 perfect floret and a sterile or staminate one below; articulation usually below glumes (spikelets mostly dorsally compressed). Subfamily *Panicoideae*

2. Spikelets with 2 sterile florets below the fertile; glumes broad; awns, when present, from notched apex. Tribe *Phalarideae*

Spikelets without sterile florets below fertile. 3

3. Spikelets sessile, in spikes on the rachis. 4

Spikelets pedicellate in open to contracted panicles (if spike-like, then arising all around axis). 5

4. Spikes terminal, solitary; spikelets arranged in 1's, 2's, or 3's, on opposite sides of the axis. Tribe *Hordeae*

Spikes usually more than 1; spikelets arranged on one side of axis in 2 rows. Tribe *Chlorideae*

5. Spikelets 1-flowered (sometimes 2 in *Muhlenbergia*). Tribe *Agrostideae*

Spikelets more than 1-flowered. 6

6. Glumes shorter than first floret; lemmas awnless or awned from tip or cleft apex. Tribe *Festuceae*

Glumes equalling or longer than first floret; awnless or awns arising from back of lemma (from a notch between apical teeth in *Danthonia*). Tribe *Aveneae*

Key to Hordeae

1. Spikelets solitary at each node. *Agropyron*

Spikelets more than 1 per node. 2

2. Spikelets 3 per node, lateral pair reduced to awns. *Hordeum*

Spikelets 2 per node. 3

3. Plants mostly over 5 dm. tall; rachis not disarticulating at maturity. *Elymus*

Plants 1-5 dm. tall; glumes and lemmas awned, 2-10 cm. long; rachis disarticulating at maturity. *Sitanion*

Key to Phalarideae

1. Lower florets elongate, staminate (neutral); florets brownish. *Hierochloe*

Lower florets reduced, sterile; florets pale-greenish; panicles compact. *Phalaris*

Key to Aveneae

1. Spikelets disarticulating below glumes, 2-flowered; first glume narrow-lanceolate, the second broad-wedge-shaped, hooded; lemmas scabrous. *Sphenopholis*

Spikelets without above combination of characteristics. 2

2. Lemmas essentially awnless. *Koeleria*

Lemmas with evident awns. 3

3. Ligule a ring of hairs; awns bent, arising from a notch between apical teeth of lemmas. *Danthonia*

Ligules membranous; awns arising from back. 4

4. Blades with boat-shaped tips; spikelets 1-1.5 cm. long, 3-6 flowered. *Helictotrichon*

Spikelets less than 1 cm. long, usually 2-flowered. 5

5. Lemmas keeled; awns bent, arising from above the middle of lemma. *Trisetum*

Lemmas not keeled, truncate-erose at the apex; awns arising from below the middle. *Deschampsia*

Key to Festuceae

1.	Tall reed-like grasses to 3 m.; ligule a ring of hairs; panicles open-plume-like; rachilla hairs about the length of lemmas.	*Phragmites*
	Plants smaller, not over 12 dm. tall.	2
2.	Plants unisexual, culms from creeping rhizomes; ligules a ring of hairs; plants of saline or alkaline habitats.	*Distichlis*
	Plants without this combination of characteristics.	3
3.	Spikelets 2-flowered, disarticulating below glumes; first glume narrow (lanceolate), the second broad and somewhat hooded at apex.	*Sphenopholis*
	Glumes not distinctly dissimilar.	4
4.	Lemmas with 3 prominent nerves; often aquatic.	*Catabrosa*
	Lemma nerves more than 3, not always prominent.	5
5.	Base of florets bearded.	6
	Base of florets not bearded.	8
6.	Lemma summit fringed, awnless; tall grasses of wet habitats.	*Scholochloa*
	Lemma summit 2-cleft, awned.	7
7.	Lemmas (excluding awns) 5-7 mm. long; sheaths open.	*Trisetum*
	Lemmas about 10 mm. long; sheaths closed.	*Schizachne*
8.	Lemmas with awns 1 mm. long or more.	9
	Lemmas awnless or with awns to 1 mm. long.	11
9.	Spikelets over 12 mm. long; awns from cleft apex; sheaths mostly closed.	*Bromus*
	Spikelets less than 12 mm. long; awns terminal; sheaths open.	10
10.	Annuals.	*Vulpia*
	Perennials.	*Festuca*
11.	Panicles congested; spikelets in one to several dense clusters.	12
	Panicles open; spikelets not in dense clusters.	13

12. Panicle branches short, forming a solitary spike; leaves narrow, folded to rolled; ligules 1-2 mm. long; native. *Koeleria*

Panicle branches 1-10 cm. long, spikes with several 1-sided clusters; blades flat, 3-10 mm. wide; ligules 3-9 mm. long; introduced. *Dactylis*

13. Lemmas 8 mm. long or more. 14

Lemmas less than 8 mm. long 15

14. Sheaths open; lemma nerves often obscure. *Festuca*

Sheaths closed; lemma nerves prominent. *Bromus*

15. Lemma nerves not parallel, converging toward tip. 16

Lemma nerves parallel, the tip broadly obtuse/squared off. 17

16. Lemmas mostly less than 6 mm. long; glumes usually compressed-keeled. *Poa*

Lemmas 5 mm. long or more; glumes not compressed-keeled. *Festuca*

17. Sheaths open; lemma nerves not prominent. *Puccinellia*

Sheaths closed; lemma nerves prominent. *Glyceria*

Key to Agrostideae

1. Inflorescence mostly spike-like; disarticulation below glumes. *Alopecurus*

Inflorescence mostly not spike-like; disarticulation above glumes. 2

2. Lemmas hardened, enclosing palea and caryopsis; awns long 3

Lemmas not hardened; awns short. 5

3. Awns 3-divided. *Aristida*

Awns not divided. 4

4. Florets slender; awns persistent, twisted, more than 1.5 cm. long. *Stipa*

Florets plump; awns early deciduous, not twisted, to 1.5 cm. long. *Oryzopsis*

5. Ligule a ring of hairs. 6

Ligule membranous. 7

6. Spikelets less than 3 mm. long; leaves to 5 mm. broad. *Sporobolus*

Spikelets more than 3 mm. long; leaves often over 5 mm. broad. *Calamovilfa*

7. Lemmas less than 4 mm. long, short-pointed. *Muhlenbergia*

Lemmas awnless or with an awn from the back. 8

8. Panicles dense; glumes awn-tipped. *Phleum*

Panicles not dense; glumes not awn-tipped. 9

9. Lemmas with little or no hair at the base; palea small or absent. *Agrostis*

Lemmas conspicuously bearded at the base; palea evident. *Calamagrostis*

Key to Chlorideae

1. Spikes not comb-like; spikelets 4 mm. long or less. 2

Spikes comb-like; spikelets more than 4 mm. long. 3

2. Spikelets circular, about 3 mm. long; blades flat, 5-10 mm. wide; sheaths muriform; wetland grass. *Beckmannia*

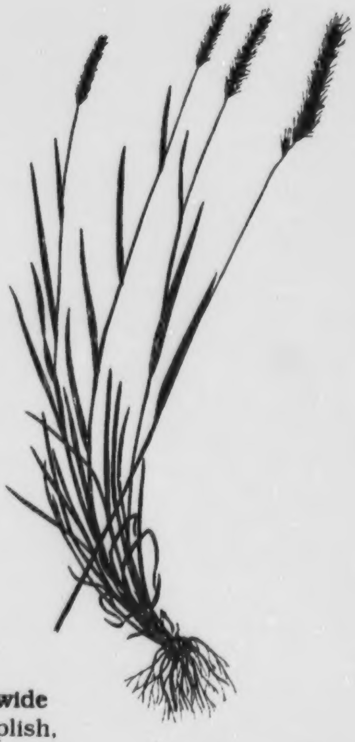
Spikelets about 4 mm. long; blades twisted, 1-2 mm. wide, white-margined; upland grass. *Schedonnardus*

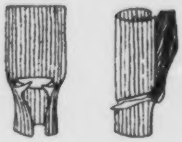
3. Plants to 4(5) dm. tall; spikes 1-2(3); blades 1-2 mm. wide; plants of dry habitats. *Bouteloua*

Plants 3-15 dm. tall; spikes 1-4; blades 2-15 mm. wide; plants of moist to wet places. *Spartina*

AGROHORDEUM Camus - Wild Rye

Agrohordeum macounii (Vasey) Lep. - Macoun's Wild Rye
Syn. *Elymus macounii*





Growth Habit:	Densely **tufted**, erect perennials, 5-10 dm. tall.
Blades:	To 5 mm. wide, 5-20 cm. long, firm, flat to inrolled, long-pointed, roughened on margins and usually also on both surfaces.
Sheaths:	Round, split, retorsely hairy to hairless, **often purplish at base**; veins prominent; margins pale.
Ligules:	To 1 mm. long, membranous, truncate, hair-fringed.
Collars:	Often indistinct, divided, light brown to green, hairless.
Auricles:	**Absent to rudimentary.**
Heads:	Spikes **slender, about 1 cm. wide** (including awns), green to purplish, **readily disarticulating at maturity**; spikelets appressed, mostly **2-flowered**; glumes **bristle-like, narrowly lanceolate, lacking thin margins, 1-3 nerved**, gradually tapered into awns, roughened; lemmas slightly roughened, with **straight awns 1-2 cm. long**.
Habitat & Distribution:	Frequent in the prairie and parkland regions, with a few occurrences throughout the boreal forest, montane and foothills areas. Grows in moist meadows, often in moderately saline areas, in open woods.
Forage Value:	Fair, palatable at early vegetative stages, before head emergence; protein content is high in the spring, and as with the parent

species, drops steadily as the season advances.

Grazing Response: An increaser, sometimes locally abundant, and considered to be one of our most common hybrids; characteristic of hybrids, aggressiveness is kept in check as seed produced is sterile, thus maintenance of populations is reliant upon the survival of the parent species.

Notes: *A. macounii* is a hybrid between *Agropyron trachycaulum* and *Hordeum jubatum*, locally probably our most common hybrid grass; unlike rhizomatous plants, propagation options are limited to ongoing crosses between the original parent species.

AGROPYRON Gaertn. - Wheat Grass

Common Characteristics

- Perennials, many rhizomatous.
- Auricles usually present, sometimes only one, and sometimes rudimentary.
- Spikelets several flowered, sessile.
- Spikelets one per node (occasionally two in *A. smithii* and in hybrids with *Elymus*).

Key to Agropyron

1. Spikelets in a more or less comb-like arrangement, rather broad (oval-oblong), flattened, mostly less than 1 cm. long; awns, when present, less than 5 mm. long; introduced. 2

   Plants not as above; origin variable. 3

2. Leaves hairy above; heads oval-oblong, spreading; lemmas hairy, rachis glabrous; lemma awns about 2 mm. long. *A. pectiniforme*

   Leaves glabrous above; heads more linear and longer (to 1.5 dm.), the spikelets ascending; lemmas glabrous, rachis sometimes hairy; awns absent or less than 2 mm. long. *A. sibiricum*

3. Rhizome short or absent; spikes open, the spikelets generally shorter than the internodes; glumes 4-6 nerved; lemmas glabrous; awns, when present, divergent, 1-2 cm. long; anthers over 5 mm. long. *A. spicatum*

   Plants not as above 4

4. Rhizomes present; anthers 3-7 mm. long 8

   Rhizomes absent; anthers 1.5-2 mm. long. 5

5. Tall plants to 2 m.; spikelets in a sickle-shaped arrangement; glume tips square; introduced. *A. elongatum*

   Plants to 15 dm. tall; spikelets and glumes not as above. 6

6. Spikes less than 10 cm. long and usually imbricate (in native forms); glume margins with hyaline portion to 1 mm. wide, glumes with 3-4 nerves; lemmas usually hairy. *A. violaceum*

   Spikes mostly more than 10 cm. long; spikelets distant; glumes with hyaline margins narrow (less than 0.5 mm. wide), glumes with 6-7 nerves; lemmas mostly glabrous. 7

7. Awns on lemmas 15-40 mm. long. *A. trachycaulum* var. *unilaterale*

Awns on lemmas 5 mm. long or less. *A. trachycaulum* var. *trachycaulum*

8. Outer sheath margins and leaf margins distinctly ciliate; introduced. 9

Conspicuous ciliation lacking.. 10

9. Leaf surfaces mostly glabrous; lemmas glabrous. *A. intermedium*

Leaf surfaces with some hairs; lemmas hairy. *A. trichophorum*

10. Leaves flat, 4-8 (10) mm. wide; sheaths and upper leaf surface hairy; introduced. *A. repens*

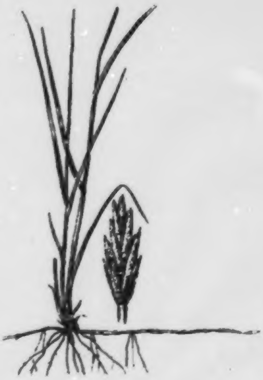
Leaves mostly rolled, if flat, 2-4 mm. wide; native. 11

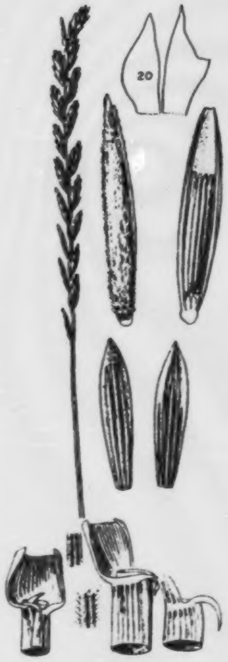
11. Glumes mostly keeled, long-pointed, broadest below the middle, nearly as long as the lowest lemma; foliage blue-purplish green, the auricles purple-based; anthers 3-4 mm. long. *A. smithii*

Glumes flat to rounded on back, broadest above the middle, acute, about ½ the length of the lowest lemma; foliage light green to blue green, auricles not purple-based; anthers at least 4 mm. long. *A. dasystachyum*

Agropyron dasystachyum (Hook.) Scribn. - Northern Wheat Grass
Syn. *Elymus lanceolatus* spp. *lanceolatus*

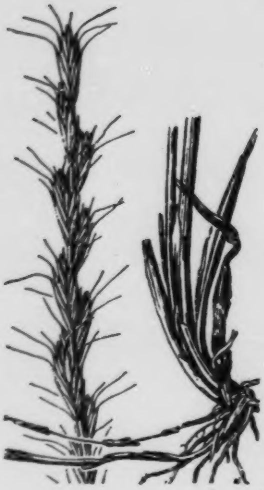
Growth Habit:	Perennial with deep feeding roots; **rhizomatous**.
Blades:	Flat to inrolled, **light green to blue green**, to 6 mm. wide; blades ridged and roughened on upper surface; smooth or sometimes roughened near base underneath; margins roughened; leaves mostly erect, **inserted at a narrow angle to the stem**.
Sheaths:	Rounded, split, smooth or slightly roughened; midrib often continuing part way down; margins pale, often overlapping.
Ligules:	To 1 mm. long, membranous, blunt, lacerate.
Collars:	Divided, smooth, light green.
Auricles:	To 2 mm. long, clasping, slender; sometimes 1 longer than the other, but **both always present**.
Heads:	Spikes 5-20 cm. long, spikelets loosely to closely overlapping, 4-8 flowered; glumes 3-5 nerved, **broad at and above the middle and narrowed at the base**; glumes pale-margined, pointed or awn-tipped, roughened to hairy, conspicuously **shorter than lemmas**; lemmas awnless, **hairy**; **anthers 4 mm. long or more**.





Related Species:

1. ***Agropyron dasystachyum*** var. ***riparium*** (Scribn. & Smith) Bowden - Streambank Wheat Grass
   Differs as follows:
   - Lemmas roughened or smooth, not hairy, sometimes with a few long hairs at the base.
2. ***Agropyron albicans*** Scribn. & Smith var. ***albicans*** - Awned Northern Wheat Grass
   Differs as follows:
   - Lemmas with conspicuous curved awns 5-15 mm. long.
   - Glumes apparently mostly 2-3 nerved.
3. ***Agropyron albicans*** Scribn. & Smith var. ***griffithsii*** (Scribn. & Smith) Beetle - Griffith's Wheat Grass
   - Similar to var. *albicans* except lemmas hairless or with a few long hairs at the base.



Habitat & Distribution:

Common in most Ecoregions, less frequent northward. Found in prairie grassland, on dry slopes, in dry open woods, sand hills. An indicator of subxeric sites in western regions. Var. *albicans*, *riparium* and *griffithsii* have similar distribution but occurrences are sporadic.

Forage Value:

Good, protein content averaging 16% in the spring, dropping to about 4% by October; energy-producing elements remain high (about 45%) throughout the season and plants cure on the stem, making good winter pasture and hay; northern wheat grass is moderately palatable to all classes of livestock, but becomes progressively less attractive as stems mature and become wiry.

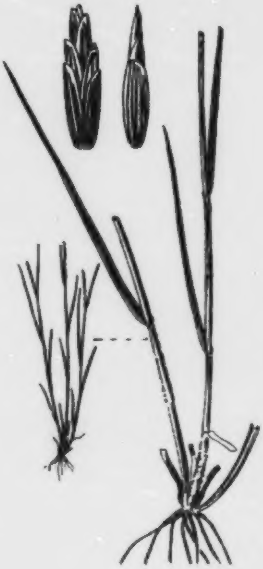
Grazing Response:

Decreases in driest regions, but classed as an increaser #1 in many areas with better moisture; *A. dasystachyum* withstands fairly heavy grazing and trampling, and replaces less aggressive climax grasses under continuous and heavy utilization.

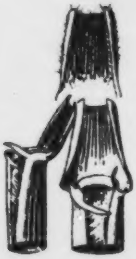
Notes:

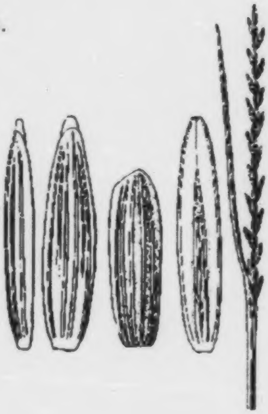
Also known as thickspike or downy wheat grass; from the Greek *agrios*, meaning wild, *pyros*, meaning wheat; northern wheat grass is widely used as an early successional species as it establishes quickly and spreads readily by rhizomes; several named cultivars are currently available, and are well adapted to all ecoregions; on saline or alkaline sites, however, western wheat grass should be substituted.

Agropyron intermedium (Host) Beauv. - Intermediate Wheat Grass
Syn. *Thinopyrum intermedium - Elytrigia intermedia*



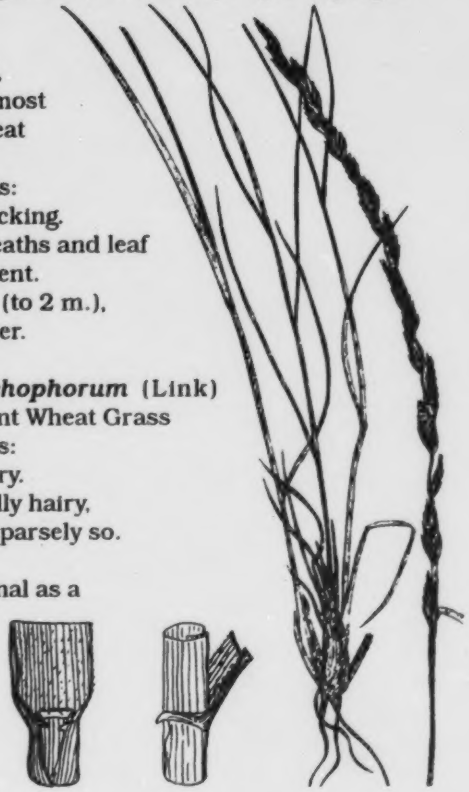
Growth Habit:	Erect perennial with **well developed rhizomes**; culms to 1 m. tall.
Blades:	**To 10 mm. wide** and to 15 cm. long, flat, light green, usually hairless; midvein prominent on back; **margins hair-fringed**; rolled at emergence.
Sheaths:	Inner margin pale, **outer margin hair-fringed**.
Ligules:	Less than 1 mm. long, toothed.
Collars:	To 2 mm. wide, yellow, continuous.
Auricles:	**Usually rudimentary**, not visible, but sometimes small slender auricles present.
Heads:	Spikelets large, well spaced, 2-6 flowered; glumes ½ as long as lemmas, pointed, usually obliquely so.





Similar Species:

1. ***Agropyron elongatum*** (Host) Beauv. Syn. *Elytrigia elongata* Tall Wheat Grass
   Also introduced, considered the most salt tolerant wheat grass species.
   Differs as follows:
   - Rhizomes lacking.
   - Hairs on sheaths and leaf margins absent.
   - Plants taller (to 2 m.), foliage coarser.



Related Species:

1. ***Agropyron trichophorum*** (Link) Richt. - Pubescent Wheat Grass
   Differs as follows:
   - Lemmas hairy.
   - Leaves usually hairy, sometimes sparsely so.

Habitat & Distribution:

Introduced, occasional as a reclamation and forage species.

Forage Value:

Good, nutritional elements in good balance, protein content averaging 19% in the spring and about 15% at maturity; intermediate wheat grass is useful as fall pasture as plants cure on the stem to some extent and often show some fall growth; as well, it is generally palatable throughout the season and produces good yields of palatable hay, but as with most grass species, nutritional value is enhanced when legumes are included in the hay mix.

Grazing Response:

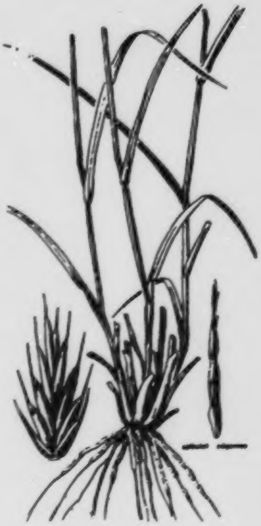
An invader, native to E. Europe; not particularly aggressive, it is seldom troublesome in native rangeland.

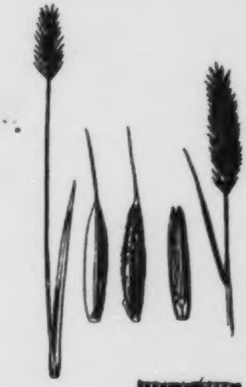
Notes:

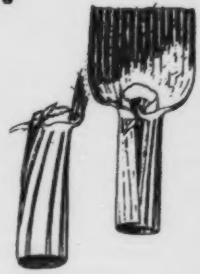
Intermediate wheat grass is rather widely seeded in moister regions (where annual rainfall is 380 mm. or more), useful in site stabilization while slower growing native species establish; unlike tall wheat grass, tolerance of alkaline, saline and poorly drained habitats is low; Agropyron trichophorum is more drought tolerant, more winter hardy, and longer lived than intermediate wheat grass.

Agropyron pectiniforme R. & S. - Crested Wheat Grass

Growth Habit:	Tufted perennial with dense fibrous root system; stems tend to **angle from base at 45°, then straighten**; stems to 4 dm. in height.
Blades:	Flat, 2-7 mm. broad, **hairy above**, smooth to slightly roughened below; veins conspicuous, midvein light colored; margins light colored; rolled at emergence.
Sheaths:	Round, split, smooth, the **lower usually hairy**; margins pale, overlapping.
Ligules:	**To 1.5 mm. long**, membranous, truncate, lacerate.
Collars:	Divided, distinct, light yellowish green, smooth to hair-fringed.
Auricles:	**Both usually present**, to 1.5 mm. long, clawlike.
Heads:	Spike comb-like, **oval-oblong, mostly less than 1 dm. long**, flattened; spikelets strongly spreading, **with distinct gaps between them**; lemmas hairy, axis hairless; lemma **awns about 2 mm. long**.

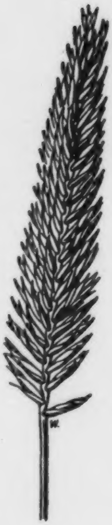






Related Species:

1. ***Agropyron sibiricum*** (Willd.) Beauv.
   Siberian or Desert Wheat Grass
   Syn. *Agropyron desertorum* (Fisch.) Schult.
   Also a common introduced species in drier regions.
   Differs as follows:
   - Leaves hairless above.
   - Heads more linear and longer, to 1.5 dm. long.
   - Spikelets less spreading, ascending.
   - Lemmas hairless but axis sometimes hairy.
   - Lemma awns shorter than 2 mm. or lacking.



Habitat & Distribution: Introduced, common, especially in drier regions.

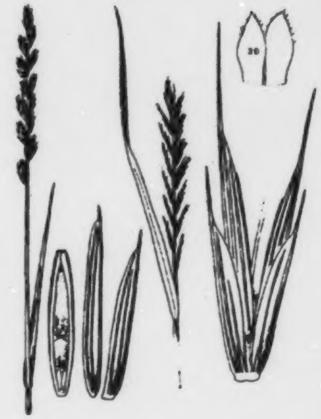
Forage Value: Good, protein content averaging 23% in the spring and dropping to 4.5% by October, other nutritional elements also in good balance; plants are palatable in early spring, but are progressively unattractive as they become coarse and stemmy; when cut early and grown with alfalfa, crested wheat grass can make fairly good hay.

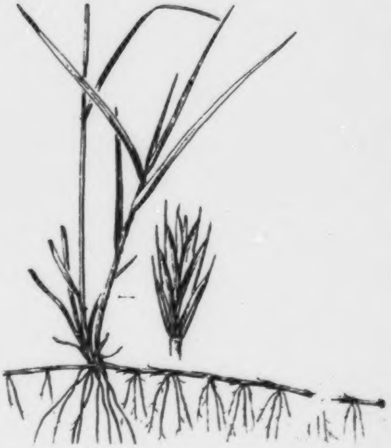
Grazing Response: An invader, introduced into Canada from Western Siberia; crested wheat grass is invasive both in waste places and in native rangelands where it replaces more desirable native grasses; there are also indications that it is a detrimental species as it appears to add little or no organic matter to soils.

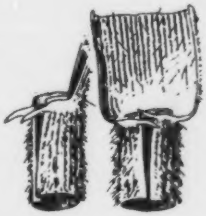
Notes: Syn. *A. cristatum*; *pectiniforme*, a reference to the comb-like arrangement of spikelets; crested wheat grass has been used extensively in the past because of its drought and cold tolerance and persistent qualities; recently, however, because of its negative attributes and as alternate native species become more readily available, it is rarely recommended in reclamation or revegetation work; some trials show that small, narrow disturbances are more readily reclaimed by natives when left unseeded than when seeded to crested wheat grass.

Agropyron repens (L.) Beauv. - Quack Grass Syn. *Elytrigia repens*

Growth Habit:	Perennials with **long, stout, yellowish-white scaly rhizomes**; plants to 8 dm. tall.
Blades:	**Flat, 5-10 mm. wide**, slightly keeled at the base, green and sometimes glaucous; **upper surface almost always long soft-hairy**, the lower smooth and margins roughened; twisted near the tip, rolled at emergence.
Sheaths:	Round, split, short, **lower sheaths hairy**, often long soft-hairy; margins overlapping, pale.
Ligules:	Less than 1 mm. long, blunt, jagged-lacerate, sometimes hair-fringed.
Collars:	Divided, distinct, broad, hairy, yellow or sometimes purple-tinged.
Auricles:	**Both well developed**, to 3 mm. long, clawlike, slender.
Heads:	Spikes erect, stiff, spikelets closely 4-8 flowered; glumes lanceolate, 3-7 nerved, 8-12 mm. long, awn-tipped; lemmas similar to glumes in shape, slightly longer, pointed to awn-tipped with straight awn to 10 mm. long; hairless to roughened.
Habitat & Distribution:	Introduced weed, common in waste places and also in cultivated fields. Absent from driest regions.





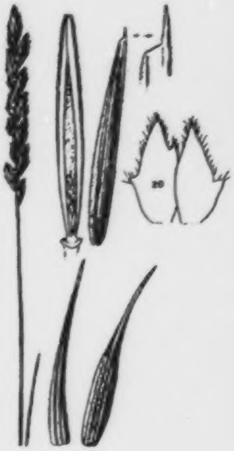


Forage Value: Good, protein content similar to that of other wheat grasses, and other nutrients averaging similar to somewhat lower; palatability is good early in the season and the species makes good hay if cut early and grown with legumes; plants cure on the stem to some extent and as such can provide some winter forage.

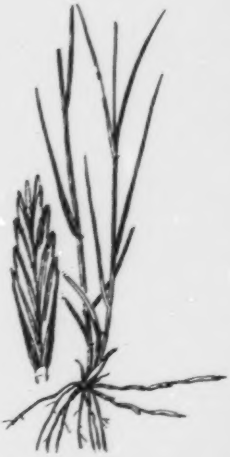
Grazing Response: An invader, Eurasian in origin; quack grass is a very aggressive species, classed as a noxious weed in all but the driest regions; it is invasive in native rangelands, often present in altered range along with Kentucky bluegrass and dandelion; *A. repens* is a prolific seed producer, and rhizome development is extensive (producing 7-9 tonnes/ha.), small segments (often transported on machinery) are capable of establishing and spreading very quickly.

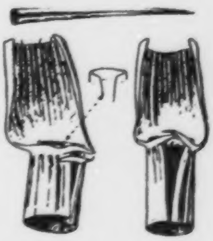
Notes: Also called couch grass; although once considered valuable in reclamation efforts as plants establish and spread quickly, quack grass is now classed as problem weed because of its invasive nature, both seed and root cuttings considered contaminants in reclamation and forage mixes.

Agropyron smithii Rydb. - Western Wheat Grass
Syn. *Pascopyrum smithii*



Growth Habit:	Perennial from **extensive creeping rhizomes**, to 6 dm. tall.
Blades:	Flat to inrolled, firm, to 6 mm. wide; **nerves prominent**; roughened (rarely hairy) above, smooth below, **glaucous, bluish to purplish-green**; margins roughened; blades **grow 45° from stem**; rolled at emergence.
Sheaths:	Round, split, veins conspicuous, hairless, brownish or purplish at the base; margins pale.
Ligules:	To **0.5 mm. long**, membranous, truncate, lacerate or hair-fringed.
Collars:	Continuous, medium-broad, hairless, light green; not well defined, sometimes oblique.
Auricles:	**Mostly equal** in length, clawlike, clasping, usually **purplish at base**.
Heads:	Spikes fairly closely overlapping, sometimes 2 per node, 6-10 flowered, glumes to 12 mm. long, stiff, **keeled, broadest at base, often as long as lowest lemma**; lemmas **hairless** or hairy in var. *molle* (Scribn. and Smith) Jones, similar to glumes in size and shape, usually with a short awn, **anthers 3-4 mm. long**.
Habitat & Distribution:	Common in the prairies, also found on suitable sites in the foothills and parkland regions, occasional northward. Common in grasslands, especially in low-lying areas and on heavy alkaline and saline soils.

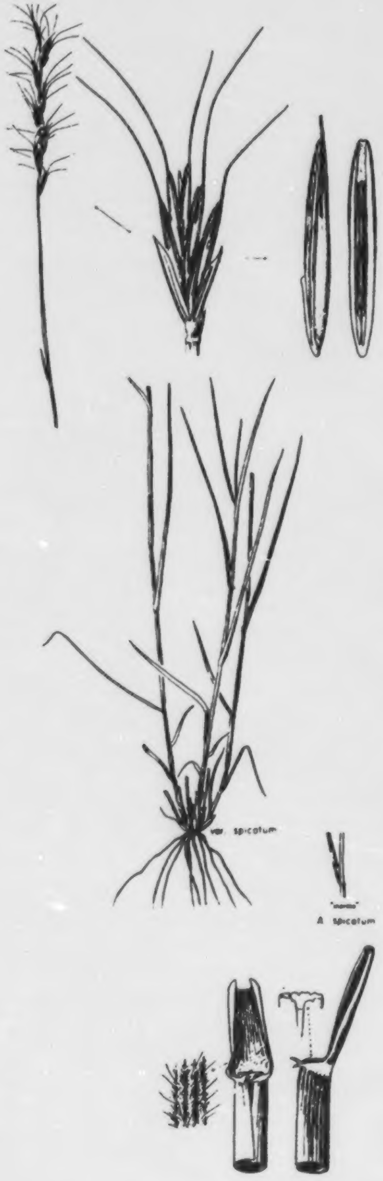




Forage Value:	Good, protein content averages 18% in the spring and drops to 3-4% by October, digestible carbohydrates increasing from 40% to 50% during the same period; plants cure on the stem, and provide good fall and winter forage; western wheat grass is valued as native hay, having up to 60% digestibility and pure stands capable of producing 4000 kg./ha. under good conditions.
Grazing Response:	Decreases in driest regions, but classed as an increaser #I in areas with better moisture where it can withstand fairly heavy grazing pressure.
Notes:	Syn. *A. occidentale*, also known as bluestem, blue joint, western couch grass; *A. smithii* is a natural reclamation species, moving onto disturbances and along trails, valued for its ability to quickly stabilize sites and its tolerance of moist, alkaline or saline areas; it is currently widely used in reclamation work, with considerable amounts of seed available on the commercial market.

Agropyron spicatum (Pursh) Scribn. & Smith - Bluebunch Wheat Grass
Syn. *Pseudoroegneria spicata*

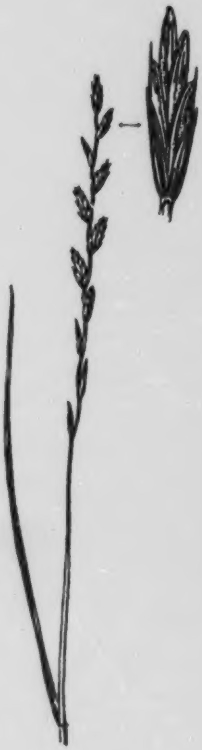
Growth Habit:	**Densely tufted** perennial, **often blue-green**, forming bunches up to 1.5 dm. broad; culms slender, 3-10 dm. tall, sometimes hairy just below nodes.
Blades:	Leaves **slender**, to 5 mm. wide, flat to inrolled, ridged; **roughened to coarse-hairy above, midrib and veins prominent below**, often minutely hairy between veins; rolled at emergence.
Sheaths:	Round, split, strongly veined, hairless; margins overlapping, pale, **brownish at base of plant**.
Ligules:	**To 0.5 mm. long**, membranous, truncate and lacerate.
Collars:	Continuous, (sometimes divided), hairless, yellowish.
Auricles:	To 1.5 mm. long, **rudimentary to short-clawlike**, fragile, usually enough auricle (under magnification) to key to *Agropyron*.



Heads: Spikes 8-15 cm. long, **spikelets distant, not closely overlapping**; glumes awnless or with very short awn-tips, 5-10 mm. long, 4-6 nerved, **shorter than lowest lemmas**; lemmas 8-10 mm. long, hairless to roughened, with **awns 1-2 cm. long, these curved outward at right angles**; anthers over 5 mm. long.

Related Species:

1. ***Agropyron spicatum*** var. ***inerme*** (Scribn. & Smith) - Beardless Bluebunch Wheat Grass
   Differs as follows:
   - Lemmas awnless or with very short awn-tips.



Habitat & Distribution: Grows on dry slopes and in dry open areas, especially common in the southern foothills and southern Rocky Mountain regions.
Var. *inerme* found throughout this range, but less common.

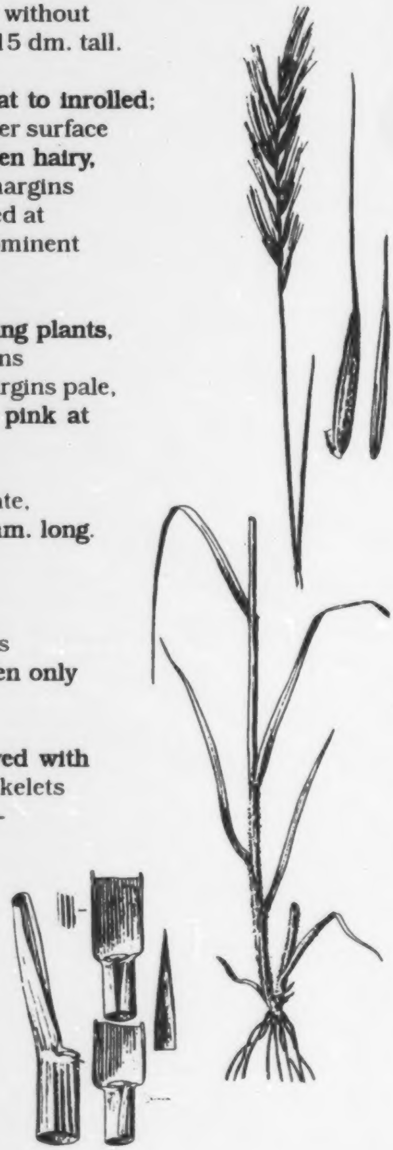
Forage Value: Good, nutritional elements in good balance and remaining relatively high throughout the growing season; *A. spicatum* is generally palatable to livestock and game except when left ungrazed and old growth accumulates; wiry stems and awns also tend to lower palatability later in the season.

Grazing Response: A decreaser, declining with continued heavy use and early grazing, which prevents the development of adequate seed to ensure stand maintenance.

Notes: Also known as big or wire bunch grass, spiked wheat grass; *A. spicatum* is important in providing cover and preventing erosion on sites too dry to support other grasses, particularly on exposed slopes where it often naturally occurs; when grown under good conditions, it produces an abundance of viable seed; the awnless variety *inerme* is recommended as a reclamation or revegetation species in order to eliminate problems incurred when handling awns with conventional machinery.

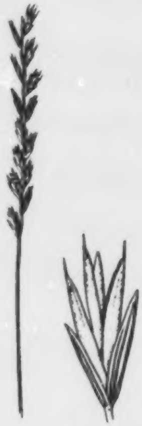
Agropyron trachycaulum (Link) Malte var. ***unilaterale*** (Cassidy) Malte - Awned Wheat Grass
Syn. *Elymus trachycaulus (Elymus trachycaulus* ssp. *subsecundus)*

Growth Habit:	**Densely tufted** perennials without rhizomes, culms erect, to 15 dm. tall.
Blades:	Leaves **4-10 mm. wide, flat to inrolled**; pale green/blue-green; upper surface ridged and roughened, **often hairy, especially when young**; margins roughened and white; rolled at emergence; midrib not prominent below.
Sheaths:	Round, split, **hairy in young plants**, often hairless with age; veins prominent, light green, margins pale, **brownish or occasionally pink at base**.
Ligules:	Membranous, blunt-truncate, lacerate, brownish, **to 1 mm. long**.
Collars:	Divided, light brown.
Auricles:	**Inconspicuous**, sometimes appearing absent, and **often only one visible**.
Heads:	Spikes **often slightly curved with spikelets on one side**; spikelets overlapping to remote, few-flowered; **glumes nearly as long as spikelets, 10-16 mm. long** with short awns; lemmas roughened, with a **straight awn 15-40 mm. long**; anthers 1.5-2 mm. long.



Related Species:

1. ***Agropyron trachycaulum*** (Link) Malte var. ***glaucum*** (Pease & Moore) Malte
   - As *A. trachycaulum* var. *unilaterale* except glumes shorter, 6-10 mm. long, and lemma awns only 5-15 mm. long.
2. ***Agropyron trachycaulum*** (Link) Malte var. ***trachycaulum*** - Slender Wheat Grass
   Differs as follows:
   - Leaves flat, medium green (glaucous in some varieties.)
   - Leaf margins and both surfaces roughened but not hairy (some introduced cultivars may be hairy).
   - Sheaths hairless, lower sheaths and stems purplish.
   - Lemmas awnless to short awn-tipped.
   - Spikelets well spaced, remote; glumes as long as lowest lemmas.



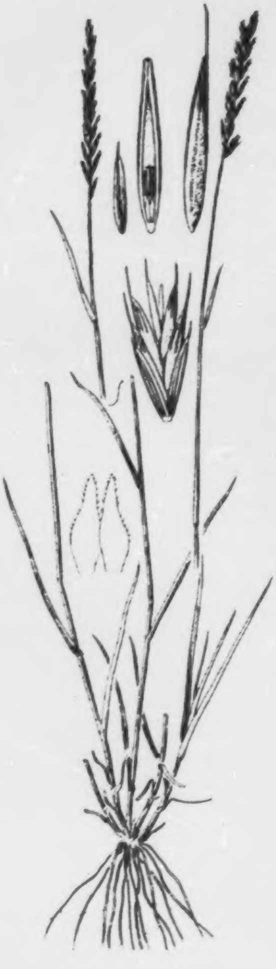
Habitat & Distribution: Common, especially in parkland, montane and foothills regions, also occurs in better soils and on moist sites in the prairies, occasional in northern regions.

Forage Value: Good, protein content averaging 23% in the spring, dropping to 8-10% by October; the leafy growth is palatable at all stages of maturity, but stems and heads are generally unpalatable; awned wheat grass makes rather poor hay due to the coarseness of the stems and because plants are short lived.

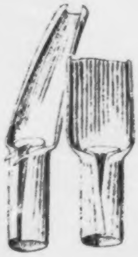
Grazing Response: Decreases in driest regions, but an increaser #1 in better soil and moisture zones; *A. trachycaulum* is fairly resistant to heavy grazing, and gains a reproductive advantage as the seed heads are generally ungrazed.

Notes: Syn. *A. caninum (Elymus caninus) A. subsecundum;* also known as bearded wheat grass; both awned and slender wheat grass are widely grown as reclamation species; valued as early successional grasses, they provide early cover, then die back, allowing slower growing climax species to establish (peak production is between 2 and 4 years); only a moderate amount of seed is produced, but this usually shows high viability.

Agropyron violaceum (Hornem.) Lange - Broad-glumed Wheat Grass



Growth Habit:	Loosely tufted plants, 2-5 dm. tall; rhizomes absent.
Blades:	Leaves short and clustered near the base, rather numerous, flat, 2-5 mm. broad, hairy to glabrous.
Sheaths:	Round, split, hairy in young plants and often remaining so, sometimes pinkish at base.
Ligules:	Membranous, blunt, lacerate, to about 1 mm. long.
Auricles:	Present but not conspicuous, one often longer.
Heads:	Spikes 3-7 cm. long, the spikelets purplish, imbricate; glumes 3-4 nerved, with broad hyaline margins, not symmetrical, with short-awn tips; lemmas hairy, awnless or with awns 5-6 mm. long.
Habitat & Distribution:	Found in the Rocky Mountain region and in northern mountainous areas. Grows on slopes and in meadows from montane to alpine elevations.
Forage Value:	Good, very similar to awned wheat grass in terms of nutritional value and palatability; broad-glumed wheat grass is a smaller species, but with relatively high productivity of herbage due to its characteristic leafy growth.
Grazing Response:	An increaser in its adapted range.



Notes:

Syn. *A. latiglume*; *A. violaceum* is recommended as an early successional reclamation species, essentially a substitute for awned/slender wheat grass at high elevations and in the north; its response in plot trials shows somewhat slower growth and establishment than the *A. trachycaulum* complex; plants sometimes produce sterile hybrids with *A. scribneri* when growing in close association; it must be noted that some material currently on the market physiologically resembles *A. trachycaulum*, with less imbricate, more elongated spikes; overall plant size, however is much reduced.

AGROSTIS L. - Bent Grass

Common Characteristics

- Perennials, some rhizomatous or stoloniferous.
- Plants without auricles but often with conspicuous ligules.
- Spikelets small, 1-flowered.
- Lemmas with little or no hairs on callus.
- Palea sometimes lacking.

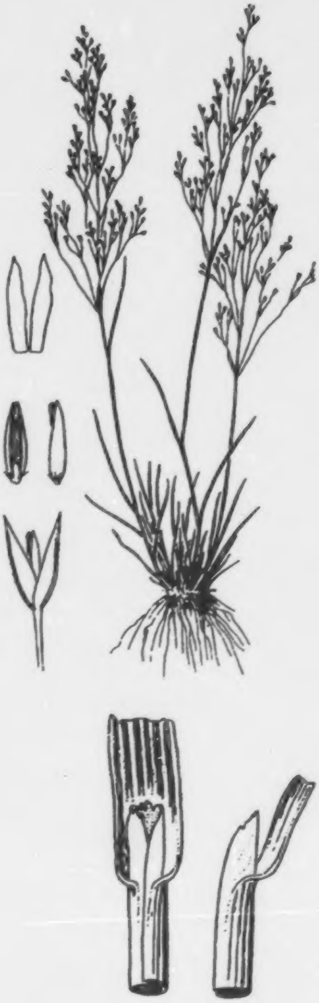
Key to Agrostis

1. Plants strictly tufted; panicles very divergent; palea absent. *A. scabra*

Plants reclining/rooting and sometimes producing stolons; panicles open but not widely divergent; palea present. *A. stolonifera*

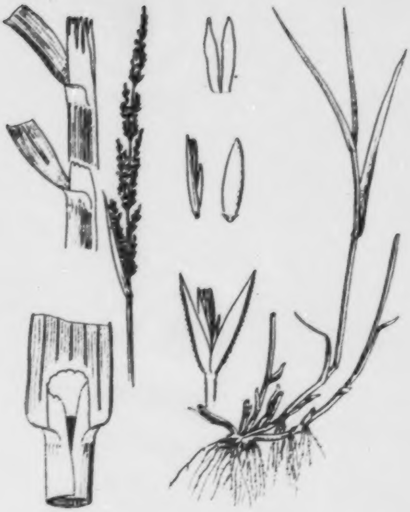
Agrostis scabra Willd. - Hair Grass; Tickle Grass

Growth Habit:	Tufted perennials with fibrous roots; plants 3-6 dm. tall.
Blades:	Blades **mostly basal, very slender, hair-like**, to 2 mm. wide, inrolled when dry; blades soft, hairless, ridged and roughened above, keeled and smooth below; margins roughened; rolled at emergence.
Sheaths:	Round, hairless, smooth, slightly keeled, white to purplish, split, with overlapping margins.
Ligules:	**To 5 mm. long**, membranous, truncate or 3-pointed, entire to lacerate, **hairy on the outside**.
Collars:	Narrow, inconspicuous, pale green.
Auricles:	**Absent.**
Heads:	Panicle 1-2.5 dm. long, broad, **very divergent with elongate roughened spreading branches**, spikelets **2-2.7 mm. long**; glumes unequal, long-pointed, roughened on keels, **one-flowered**; lemmas to 1.7 mm. long, **without palea**, not hairy at base and without awns; panicles break off and are carried by wind as tumble-weeds.



Similar Species:

1. ***Agrostis stolonifera*** L. - Red Top
An introduced species, common in moist regions throughout.
Differs as follows:
   - Plants often reclining and rooting at the nodes, also stoloniferous in var. *palustris*.
   - Blades flat, to 8 mm. wide.
   - Panicles slender to pyramidal but not wide-spreading.
   - Palea present.



Habitat & Distribution: Common throughout in moist depressional areas, also on disturbed sites.

Forage Value: Fair, nutritive value moderate early in the season and sometimes until fall if moisture is sufficient and plants remain green; *A. scabra* is palatable only until the shot-blade stage, after which it is rarely eaten; because of early growth (mid-April) hair grass can provide some grazing before late-season species green-up.

Grazing Response: An increaser, readily moving onto disturbances, often growing along livestock trails; seed heads are left ungrazed, and panicles often break off and either stick to clothing or hair, or behave as tumble-weeds, allowing increased opportunity for seed dispersal.

Notes: Syn. *A. hiemalis; agrostis*, in Greek, translates grass, *scabra*, a reference to the roughness of the panicle branches; also known as winter red top, rough hair grass; although useful as it often naturally revegetates sites too barren, rocky or infertile for more desirable species, hair grass is generally not recommended in seed mixes unless better quality grasses are unavailable.

ALOPECURUS L. - Foxtail

Common Characteristics

- Mostly perennials.
- Ligules usually conspicuous, auricles lacking.
- Spikelets stalked but contracted, 1-flowered.
- Spikelets disarticulating below glumes.
- Glumes awnless, hair-fringed on keel.
- Lemmas 5-nerved, with awns attached below the middle.
- Palea absent.

Key to Alopecurus

1. Plants with rhizomes. 2

Plants without rhizomes. 3

2. Heads short-ovoid, to 1 cm. wide, not blackish at maturity; lemmas rather evenly woolly; native. *A. occidentalis*

Heads elongate, narrower, 5-8 mm. wide, blackish at maturity; lemmas less evenly hairy, more so on the keel; introduced. *A. arundinaceus*

3. Rather small plants 2-5 dm. tall; leaves to 5 mm. wide; ligules 4-8 mm. long; glumes to 2.5 mm. long; native. *A. aequalis*

Plants more robust, to 6 dm. tall; leaves to 8 mm. wide; ligules to 2 mm. long; glumes about 5 mm. long; introduced. *A. pratensis*

Alopecurus aequalis Sobol. - Water Foxtail

Growth Habit: **Tufted** with fibrous roots, perennial (but also sometimes a winter annual), hairless, often reclining at base and rooting at nodes; **low growing**, 2-5 dm. tall.

Blades: Flat, **to 5 mm. wide**, long-pointed, both surfaces and margins **roughened**; **light green**; rolled at emergence.

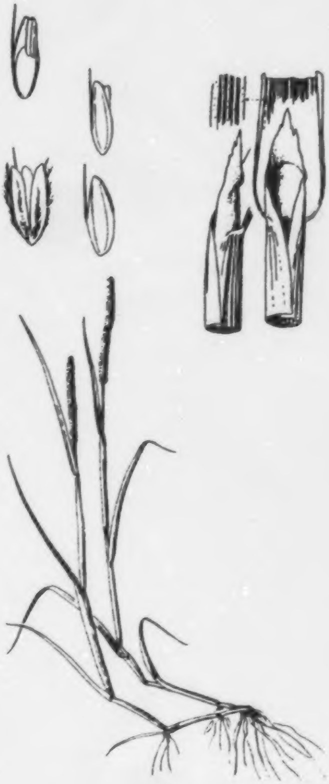
Sheaths: Rounded, split, hairless, green but base often purplish with light veins; margins pale.

Ligules: **4-8 mm. long**, pointed (but often folded back), lacerate to entire, minutely **hairy on back**, especially basally.

Collars: Medium broad, divided, oblique, light brown, hairless.

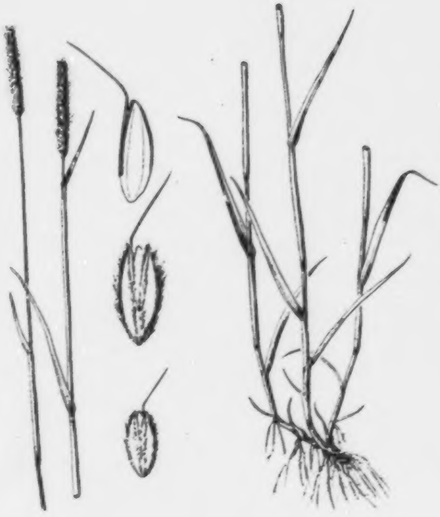
Auricles: Absent.

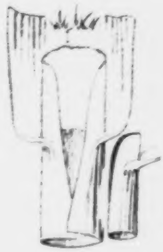
Heads: Panicle **slender**, 2-7 cm. long and 3-5 mm. broad; glumes **2-2.5 mm. long**, top blunt and pale, long-hairy on keel and basally but **not densely woolly**; awns 0.5-3 mm. long, inserted at middle of lemma; anthers 0.5-1 mm. long.



Similar Species:

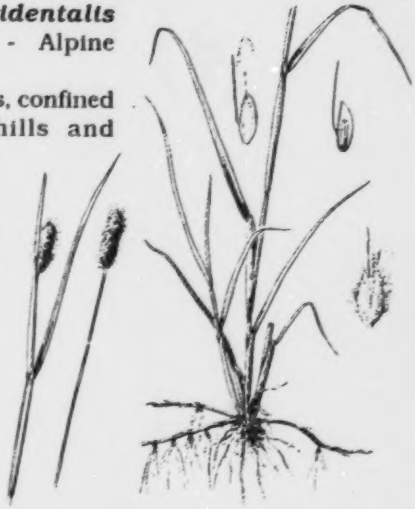
1. ***Alopecurus pratensis*** L. - Meadow Foxtail
   An introduced species, occasional throughout in moist places. Differs as follows:
   - Erect plants to 6 dm. tall, often stoloniferous.
   - Blades to 8 mm. wide.
   - Ligules to 2 mm. long, truncate.
   - Heads 5-8 mm. broad.
   - Glumes about 5 mm. long, hairy on nerves and at base but not evenly woolly.
   - Lemma awns exserted from glumes for 2-3.5 mm.
   - Seeds light brown.





2. ***Alopecurus arundinaceus*** Poir. - Creeping Foxtail
   Also introduced, occasional.
   Differs from *A. pratensis:*
   - Plants from extensive rhizomes.
   - Heads dark-blackish at maturity.

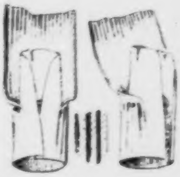
3. ***Alopecurus occidentalis*** Scribn. & Tweedy - Alpine Foxtail



A large native species, confined to southern foothills and montane regions where often locally abundant. Found in moist meadows and open woods, on shores.

Differs from *A. pratensis* and *A. arundinaceus:*

- Tall plants (1-8 dm.) from creeping rhizomes.
- Foliage often blue-green.
- Sheaths often inflated.
- Heads short-ovoid, broad (to 1 cm. thick).
- Spikelets densely woolly.
- Glumes and lemmas 3-4 mm. long.



Habitat & Distribution: Found throughout most regions. Common. A wetland grass, growing around sloughs, in water, along streams, and northward in shaded areas.

Forage Value: Good, nutritional elements in good balance: *A. aequalis* is highly palatable, and is considered a valuable component of native hay when growing with more productive species.

Grazing Response: Decreases when wetlands are used extensively.

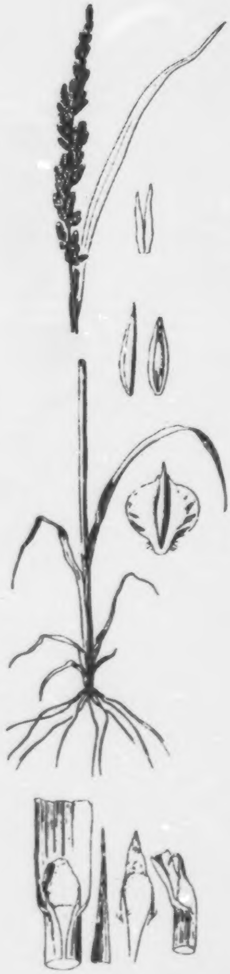
Notes: From the Greek *alopex*, fox and *oura*, tail; *A. aequalis* is useful in similar habitats as meadow foxtail (*A. pratensis*), but is also important as a native in maintaining an indigenous species composition; the light fluffy seed is difficult to handle unless specialized machinery is used or seed is coated.

BECKMANNIA Host - Slough Grass

Common Characteristics

- Large, flat leaves, to 12 mm. broad.
- Muriform venation in sheaths.
- Long pointed ligule.
- Spikelets with unique combination of characteristics.

Beckmannia syzigachne (Steud.) Fern. ssp. ***baicalensis*** (Kusnez) Koyama & Kawano - Slough Grass



Growth Habit:	Coarse annual to short-lived perennial, tufted, with fibrous roots, growing to 10 dm. in height.
Blades:	Leaves **flat, to 12 mm. wide**, and to 20 cm. long; roughened above, smooth below, midvein not prominent but present; rolled at emergence.
Sheaths:	Sheaths hairless and smooth, rounded, split; venation **muriform** from numerous cross-veins; margins overlapping, pale.
Ligules:	**Conspicuous, to 10 mm. long**, membranous, **pointed** but with blunt tips, lacerate apically with age.
Collars:	Inconspicuous, smooth, divided, yellowish to brown.
Auricles:	Absent.
Heads:	Spikelets **several, sessile**, in **two rows, one-sided**, but **not in comb-like** arrangements; **spikelets circular, 1-flowered**, flat, about 3 mm. long; glumes cross-wrinkled, about 3 mm. long, with top rounded and abruptly short-pointed; lemmas narrow, long-pointed, 5-nerved; palea nearly as long as lemma.

Habitat & Distribution:

Very common throughout most regions. Found in wet places, depressional areas, on slough margins, along streams, often inundated at least part of the season. Also grows on upland sites in regions with good soil and moisture conditions.

Forage Value:

Good, nutrient elements are in good balance, with seasonal protein content somewhat lower than that of upland grasses (about 14% in mid-June and dropping to 5% or less by August); as with most wetland grasses, slough grass makes palatable and moderately nutritious but light hay.

Grazing Response:

An increaser #I, stands usually maintained under moderately heavy use but declining when excessive grazing pressure reduces vigor and reproductive capacity.

Notes:

Named after Johann Beckmann (1739-1811), a German botanist; slough grass is valued as an early successional species in wetlands, and although short lived, stands readily re-seed themselves under normal conditions; preliminary trials show the species to have relatively low germination, this possibly due to a natural germ dormancy; seed is light but can be managed without specialized machinery, and crops can be grown on upland sites if soil and moisture conditions are favourable.

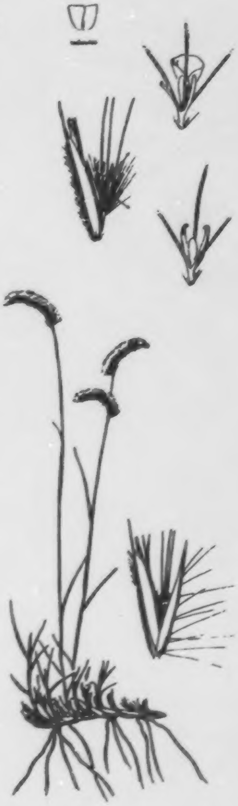
BOUTELOUA Lag. - Grama Grass

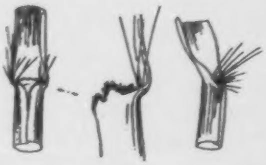
Common Characteristics

- Tufted plants, mat forming.
- Ligule a ring of hairs.
- Spikes mostly two, comb-like, purplish, on 1 side of axis.

Bouteloua gracilis (HBK) Lag. - Blue Grama

Growth Habit:	**Densely tufted** with fibrous roots but also often sod forming from **short scaly rhizomes**; low perennial 1-4 dm. tall.
Blades:	Leaves 1-3 mm. wide, **2-15 cm. long, broader at base** and tapering to a long point, **typically curled**; upper surface roughened to hairy, lower surface hairless, veins prominent; rolled at emergence; leaves often **bluish to reddish-tinged**.
Sheaths:	Rounded, split, with distinct veins; hairless to **long soft-hairy, especially near collar**; margins pale.
Ligules:	To 5 mm. long, **a dense ring of hairs**.
Collars:	Continuous, medium broad, conspicuously yellow-green, with hairs on inside margins.
Auricles:	Absent.
Heads:	Spikes 1-3, **usually 2 per stem, comb-like** and **1 sided**, 1-4 cm. long, often **curved, bluish-purple**; spikelets **sessile**, in 2 rows, with 1 perfect flower and 1 or more sterile flowers each; first glume 2-3 mm. long, the second 3-5 mm. long, often bristly-hairy on keel; fertile lemma 3-nerved, long soft-hairy, 3-awned; palea nearly the length of lemma; sterile florets long-awned, densely bearded at the base.





Habitat & Distribution: Common in the prairies, occasional on drier sites in the foothills and parkland regions. Often associated with *Stipa comata*. In western regions, an indicator of subxeric Ecosites.

Forage Value: Good, with digestibility high, nutrients well balanced and protein content high early in the season, dropping to about 5% when plants cure; palatability is lowest from spring to mid-summer, but plants are readily eaten during fall and winter; productivity is relatively low, about 140 kg./ha.

Grazing Response: An increaser, resistant to heavy grazing and opportunistic after less persistent species are grazed out; although a poor seed producer, and not rhizomatous, plants spread readily by tillers.

Notes: Named for Claudio and Esteban Boutelou, the former (1774-1842) a professor of agriculture in Madrid; *gracilis*, in Spanish, translates "grass"; blue grama was used by the Blackfoot people to predict winter weather: one spike per culm indicated a mild winter, two or more thought to forecast severe weather; blue grama is useful in reclamation on dry sites in the prairie region, but seed is expensive and in short supply, and germination is usually poor.

BROMUS L. - Brome Grass

Common Characteristics

- Annuals (usually weedy) or perennials, often hairy at or near nodes.
- Sheaths closed.
- Spikelets large, stalked, several flowered.
- Glumes shorter than lemmas.
- Lemmas cleft at top, awn (when present) arising from between teeth.
- Lemma nerves conspicuous.

Key to Bromus

1. Small introduced weedy annuals; foliage pubescent. 2

Larger perennials, foliage hairy to glabrous. 4

2. Glumes hairy, slender, 1 and 3 nerved; lemmas slender with pointed teeth 2-5 mm. long. *B. tectorum*

Glumes glabrous, the first at least 3-nerved; lemmas broader with a blunt apex; teeth short. 3

3. Panicles on short branches and somewhat contracted; spikelets mostly solitary on each branch; spikelets to 8 mm. broad (inflated); first glume 5-nerved; lemmas abruptly angular, the awns spreading, flattened. *B. squarrosus*

Panicles rather loose; first glume 1-3 nerved; spikelets not inflated; lemmas not angular; awns straight to spreading. *B. japonicus*

4. Large grasses, spikelets distinctly flattened; lemmas compressed-keeled; glumes 3-5 and 5-9-nerved. *B. carinatus*

Spikelets not flattened; glume nerves 1 and 3 (3 and 3 in *B. anomalus*). 5

5. Plants with extensive rhizomes; lemmas with short or no awns. *B. inermis*

Rhizomes very short or absent; awns usually at least 3 mm. long. 6

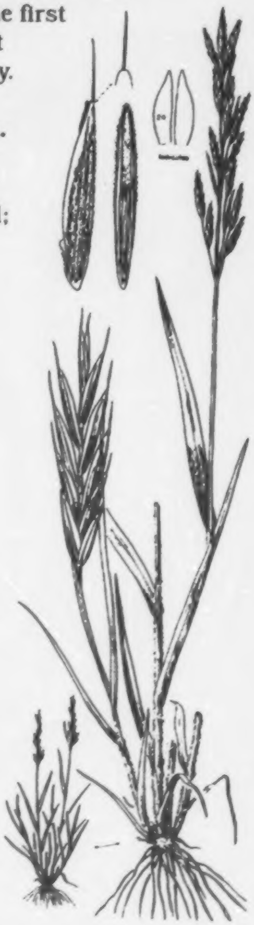
6. Leaves with long fine hairs along the margins; introduced. *B. biebersteinii*

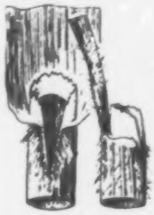
Leaves variously hairy but without distinctive marginal ciliation; native. 7

7. Glumes 1 and 3-nerved; lemmas hairy mostly along the margins; leaves 4-10 mm. wide. *B. ciliatus*

Glumes both 3-nerved; lemmas hairy over most of the surface; leaves to 4 mm. wide. .... *B. anomalus*

Bromus carinatus Hook. & Arn. - Mountain Brome; California Brome





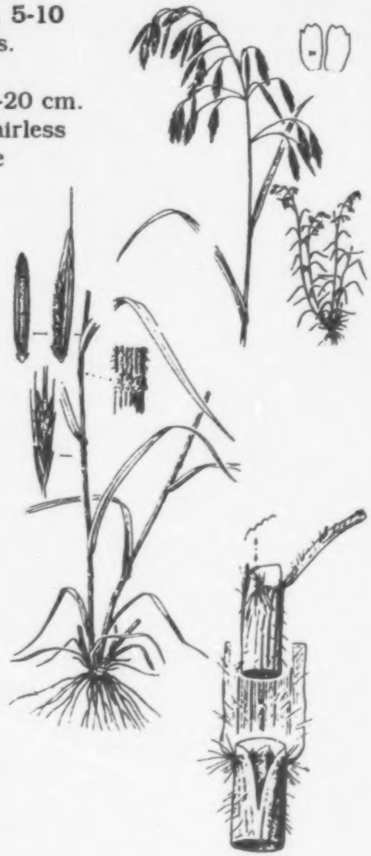
Growth Habit:	**Tufted** perennial, but often flowering the first year, stems from **6-12 dm. tall**; erect at first, **reclining at maturity**; nodes hairy.
Blades:	Basal leaves **abundant, flat, to 10 mm.** wide and **30 cm. long**; veins conspicuous, both surfaces long soft-hairy or roughened, margins roughened; rolled at emergence.
Sheaths:	Slightly compressed to rounded; split near top, otherwise closed; long soft-hairy, usually over entire surface but sometimes only at throat; veins prominent, midvein continuing down sheath.
Ligules:	**1-3 mm. long**, membranous, longitudinally corrugated, blunt, lacerate, jagged; long soft-hairy to hairless.
Collars:	Very narrow and indistinct, divided, brownish green.
Auricles:	**Absent to rudimentary** (tiny auricles to 0.5 mm. long sometimes present on some varieties).
Heads:	Panicle stiff, branches erect-ascending, **drooping at maturity**, 1-2 dm. long, spikelets **strongly compressed, large, 2-4 cm. long**; glumes **3-5 nerved (first)** and **5-9 nerved (second)**; lemmas **keeled and flattened, to 15 mm. long**, hairless to roughened or hairy; awns 2-5 mm. long.
Habitat & Distribution:	Frequent in southern foothills and montane grassland, with sporadic occurrences in the parkland region. Grows in open woods, moist meadows, shrubby coulees, in snow melt areas.

Forage Value: Good, nutritious early in the season, but levels of desirable nutrients drop off by August; as with other brome species, plants do not cure on the stem, the older growth making poor winter pasture; however, where grazed off, plants show abundant, nutritious regrowth when moisture is adequate; mountain brome is palatable to all classes of livestock throughout most of the season, although the older growth sometimes becomes stiff and fibrous by fall; seed heads are also readily consumed and the species makes good hay and produces high yields; the characteristic reclining growth habit may remain a deterrent for use as a hay species until more erect-growing forms are developed.

Grazing Response: A decreaser, due to both high palatability and non-rhizomatous growth habit.

Notes: Syn. *B. marginatus*; carinatus, a reference to the keeled lemmas; also known as big mountain brome; *B. carinatus* is an important early successional species, recommended for fescue grasslands and open woods in southern regions; it is effective in erosion control, the deep, dense root system capable of quickly stabilizing erodable slopes and disturbances; the large, heavy seed is relatively easy to handle, although plants mature early and seed tends to shatter readily; recent local supplies of seed have made the species more affordable, and selections have been made from Alberta as well as stands established along the Alaska Highway.

Bromus ciliatus L. - Fringed Brome



Growth Habit: **Non-rhizomatous** perennial, **5-10 dm. tall**, often hairy at nodes.

Blades: **Flat, lax, 4-10 mm. wide**, 8-20 cm. long; **green-yellow-green**; hairless to soft-hairy, especially above and sometimes also below; veins on both surfaces prominent, whitish midvein below extending part way down sheath; margins roughened; rolled at emergence.

Sheaths: Rounded, closed except at top, veins prominent; long soft-hairy to hairless with age.

Ligules: **About 1 mm. long**, membranous, truncate, usually minutely jagged-hair-fringed.

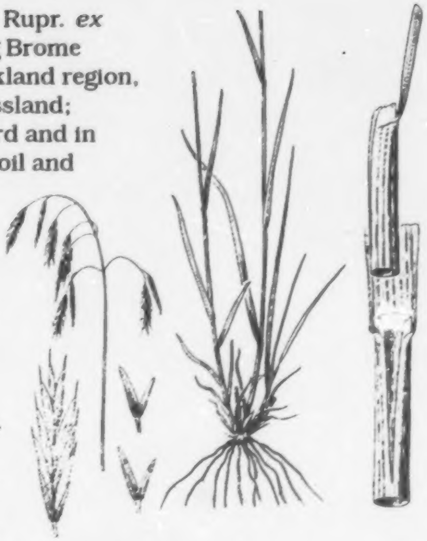
Collars: Divided, narrow, hairless, pale green to brownish, margins sometimes constricted.

Auricles: Absent.

Heads: Panicles **loose, drooping**, slender, greenish, 7-13 cm. long; spikelets **not evidently compressed; first glume 1-nerved, second 3-nerved**; lemmas 10-15 mm. long, **long-hairy along margins, hairless on the back; awns 3-5 mm. long.**

Similar Species:

1. ***Bromus anomalus*** Rupr. *ex* Fourn. - Nodding Brome Frequent in the parkland region, also in foothills grassland; occasional northward and in the prairies where soil and moisture conditions are better.
   Differs as follows:
   - Plants to 6 dm. tall.
   - Foliage dark green.
   - Blades to 4 mm. wide.
   - Glume nerves 3 and 5.
   - Lemmas evenly hairy over the entire surface.



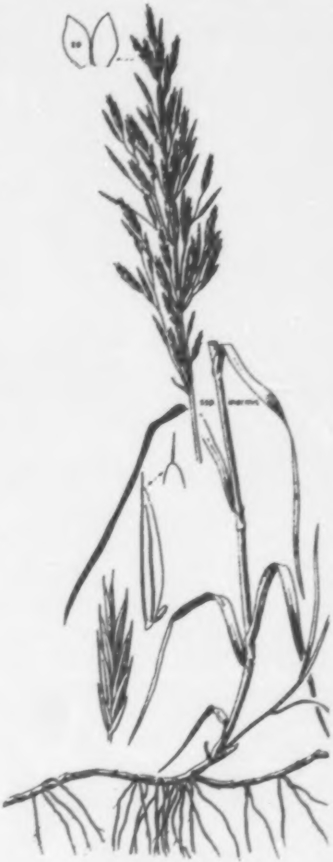
Habitat & Distribution: Found in all Ecoregions in areas with better moisture conditions. Grows in open woods, fescue grassland, moist meadows.

Forage Value: Good; although bromes do not cure on the stem, early season protein content is rated at about 20% and digestible carbohydrate content increases until early August, then declines; *B. ciliatus* is palatable to all classes of livestock from emergence until maturity, and seed heads are apparently palatable to sheep; fringed brome makes excellent hay: when cut early, pure stands produce in excess of 7 tonnes/ha.

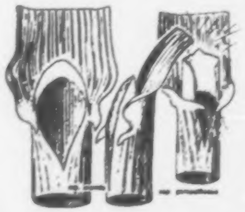
Grazing Response: A decreaser, usually found in rangelands in good to excellent condition.

Notes: The name *Bromus* is derived from the Greek *Bromos*, an ancient name for oat, denoting food; *ciliatus*, a reference to the hair-fringed lemma margins; fringed brome shows potential as an early successional reclamation species: germination is moderate, and the species grows quickly, providing essential cover while slower growing climax species establish; fringed brome is tolerant of moderately acidic soils, and can be established in western and northern regions where other good quality species might not survive.

Bromus inermis Leyss. ssp. *inermis* Leyss. - Awnless Brome

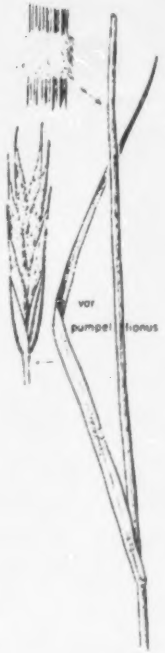


Growth Habit:	Perennial from **extensive rhizomes**, growing from 2-15 dm. tall; culms mostly hairless.
Blades:	**Flat, 5-15 mm. wide** and 15-40 cm. long; dark green, **usually hairless** but occasionally with fine hairs; veins and midribs below distinct; margins roughened; rolled at emergence; **midrib of blade not extending down sheath**.
Sheaths:	Rounded, prominently veined, **hairless** to occasionally roughened.
Ligules:	**To 1 mm. long**, blunt, entire to lacerate, base often brownish.
Collars:	Narrow, hairless, light to yellowish-green, continuous or divided by midvein.
Auricles:	**Absent, occasionally rudimentary.**
Heads:	Panicles mostly erect, 5-20 cm. long, open; spikelets not compressed, 5-13 flowered, **1.5-3 cm. long**; first glume 1 **(3) nerved**, 4-8 mm. long, second glume **3 (5) nerved**, 6-10 mm. long; lemmas 5-9 nerved, **awnless or with short awn tip** less than 3 mm. long; **glumes and lemmas hairless**.



Related Species:

1. ***Bromus inermis*** Leyss. ssp. ***pumpellianus*** (Scribn.) Wagnon - Northern Awnless Brome
   Native, common in foothills and montane grasslands, with a few populations in the parkland region and scattered throughout the north.
   Differs as follows:
   - Culms hairy, at least on nodes.
   - Leaves with some hairs.
   - Midrib of blade extending part way down sheath.
   - Sheaths (at least lower ones) long soft-hairy, often purplish basally.
   - Ligule 1-2 (3) mm. long.
   - Auricles evident (sometimes small).
   - Lemmas hairy, at least along margins (glumes usually hairless). The introduced ssp. *inermis* and the native ssp. *pumpellianus* readily hybridize when growing in close association and thus specimens with intermediate characteristics frequently occur.



Similar Species:

1. ***Bromus biebersteinii*** Roem & Schult. - Meadow Brome
   Introduced, occasional.
   Differs as follows:
   - A bunchgrass, often with very short rhizomes.
   - Leaves finer and narrower, with characteristic long fine hairs (seen especially on margins).
   - Lemmas somewhat hairy, with distinct awns.

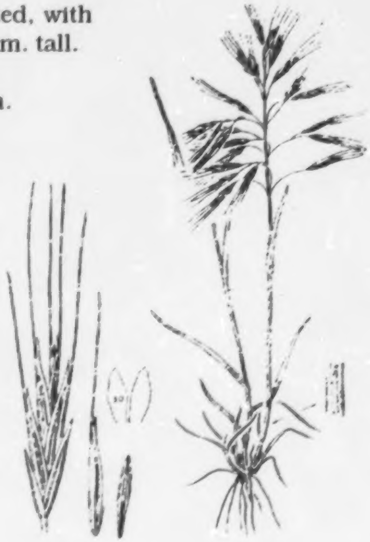
Habitat & Distribution: Introduced, widely grown in all areas with better moisture.

Forage Value: Good early in the season, from emergence to early heading stage, protein content at about 20% in May; protein levels drop to 4-6% by September, fiber increasing from 18-35%, and digestibility dropping from 60% to about 40%; palatability is good in early spring, but only leaves and heads are eaten by mid-season.

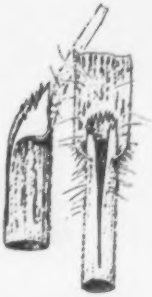
Grazing Response: An invader, native to E. Europe and Siberia; traditionally used extensively in reclamation and as a forage species; however, awnless brome is aggressive, often dominant in waste places, and invades native rangeland in areas with better soil and moisture conditions.

Notes: Also known as common, field or smooth brome; although an excellent species for site stabilization, quickly spreading by rhizomes and seed, smooth brome is not recommended for reclamation in native rangeland because of its invasive and persistent nature. *Note:* the closely related ssp. *pumpellianus* shows a similar ability to readily revegetate disturbances, but once established, is much less intrusive; the subspecies is currently under development and is recommended in reclamation trials.

Bromus tectorum L. - Cheat Grass; Downy Chess

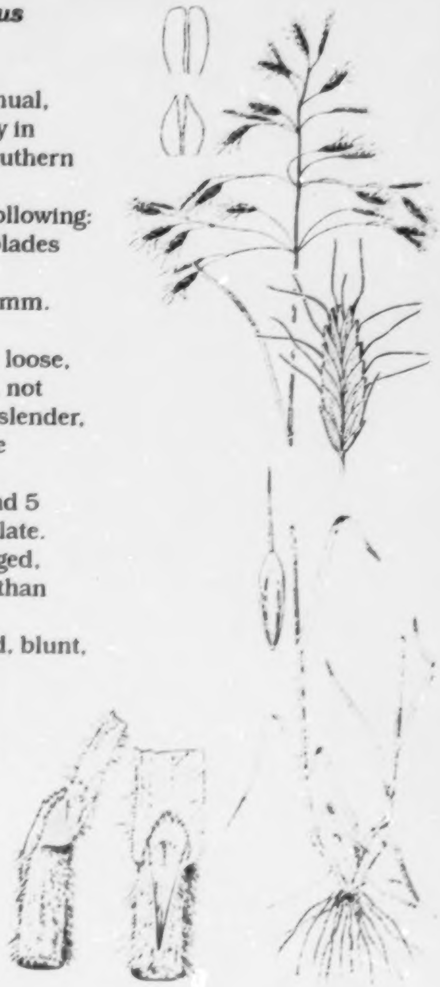


Growth Habit:	**Winter annual** (usually), tufted, with fibrous roots, averaging 60 cm. tall.
Blades:	Flat, to 8 mm. wide, 5-12 cm. long, **softly hairy**, and **margins long soft-hairy**; pale green; rolled at emergence.
Sheaths:	Keeled, **soft-hairy**, pale green, often pink to purple-tinged.
Ligules:	To 3 mm. long, truncate, lacerate-jagged, glabrous.
Collars:	Usually divided, narrow but distinct, pale, hairy.
Auricles:	Absent.
Heads:	Panicles 6-15 cm. long, somewhat compact but with **longer and lower branches drooping**, stalks slender; **glumes very narrow, long-hairy**, the **first 1-nerved, second 3-nerved**; lemmas **narrowly lanceolate**, long-pointed, usually hairy, **teeth 2-5 mm. long**; awns straight, 12-15 mm. long.



Similar Species:

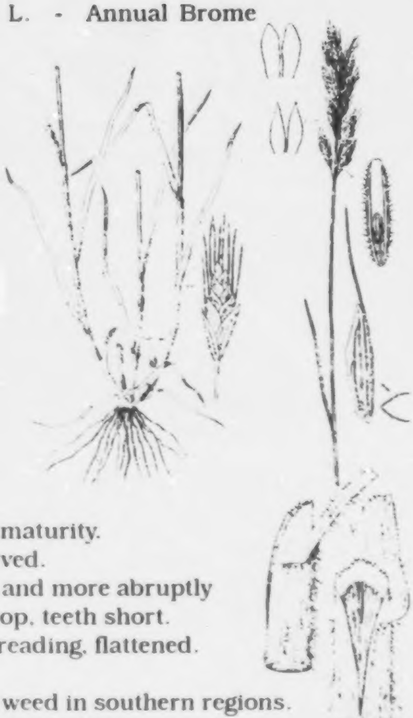
1. ***Bromus japonicus*** Thunb. -
   Japanese Chess
   An introduced annual, found occasionally in waste places in southern regions.
   Identified by the following:
   - Sheaths and blades softly hairy.
   - Ligules to 1.5 mm. long, hairy.
   - Panicles open, loose, often nodding, not one-sided, on slender, rather elongate branches.
   - Glumes 1-3 and 5 nerved, lanceolate.
   - Palea hair-fringed, much shorter than lemmas.
   - Lemmas broad, blunt, not inrolled, hairless, not angular-margined, 7-9 mm. long, teeth short.
   - Awns straight to somewhat spreading, 8-10 mm. long.
   - Anthers about 1 mm. long.



2. ***Bromus squarrosus*** L. - Annual Brome

Similar in range and habitat as *B. japonicus:*
Differs from *B. japonicus*

- Panicles more contracted, on shorter branches, often one-sided, spikelets mostly solitary on each branch.
- Spikelets broader (5-8 mm.), inflated at maturity.
- First glume 5-nerved.
- Lemmas angular and more abruptly narrowed at the top, teeth short.
- Awns strongly spreading, flattened.



Habitat & Distribution: Common, an introduced weed in southern regions. Grows in waste and disturbed places.

Forage Value: Poor, nutrient content generally lower than that of other bromes; cheat grass is moderately palatable early in the season, but unattractive at maturity as panicles expand and plants dry out.

Grazing Response: An invader, Eurasian in origin; cheat grass shows rapid growth and produces an abundance of viable seed which allows it to establish and spread very quickly; it is troublesome in waste and disturbed places, and is capable of moving onto rangeland that has been abused by overgrazing or where exposed soil naturally occurs (for example, in sandy places, on dry slopes).

Notes: Also known as downy chess, June grass; *tectorum* means "roofs", the species, in its native habitats, was used to construct thatched roofs; in spite of its fast growth and annual habit which give instant cover, the weedy nature and persistence of the species make it undesirable for revegetation; cheat grass is currently considered a contaminant in native seed mixes; in areas where *B. tectorum* is a potential problem, it is essential to seed aggressive grasses on disturbances in order to minimize opportunities for the species to become established.

CALAMAGROSTIS Adans. - Reed Grass

Common Characteristics

- Perennials, mostly with rhizomes.
- Auricles absent, ligules often prominent.
- Spikelets small, 1-flowered.
- Lemmas with awns from below the middle.
- Callus with a conspicuous ring of hairs.
- Palea present.

Key to Calamagrostis

1. Awn of lemma abruptly bent, mostly exserted; callus hairs usually much shorter than the lemma; upland grasses. 2

Lemma awn mostly straight, included; callus hairs more or less equalling lemma; wetland grasses (*C. canadensis* also in moist woods) 4

2. Plants tufted or with short rhizomes; glumes 5-8 mm. long; awns of lemmas distinctly longer than glumes. *C. purpurascens*

Lemma awns about equal in length to glumes; glumes mostly not more than 5 mm. long. 3

3. Plants tufted and also with rhizomes; glumes not conspicuously keeled, spikelets not flattened; culms smooth; leaves with hairs at junction of sheath and blade; species of western forests. *C. rubescens*

Plants not tufted, with strong rhizomes; glumes distinctly keeled, spikelets flattened; culms roughened below heads; leaves glabrous at junction of sheath and blade; grassland species, widespread. *C. montanensis*

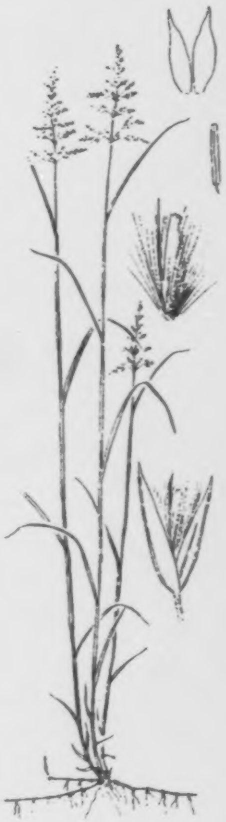
4. Blades flat, 4-8 mm. wide; panicles mostly loose and open; callus hairs about the length of the lemma. *C. canadensis*

Blades flat to involute, to 4 mm. wide; panicles contracted and lobed; callus hairs to ¾ lemma length. 5

5. Blades firm, roughened above; culms roughened (at least above); ligules 4-7 mm. long; glumes 3-4 mm. long. *C. inexpansa*

Blades more lax and smoother, mostly roughened at tips and on margins; ligules 1-2 mm. long; glumes 2-3 mm. long. *C. stricta*

Calamagrostis canadensis (Michx.) Beauv. - Marsh Reed Grass; Bluejoint



Growth Habit: Perennial, tufted but also **strongly rhizomatous**; plants 6-12 dm. tall.

Blades: Numerous, **flat, lax, to 10 mm. wide** and 7-40 cm. long; medium green; roughened and ridged above with prominent midribs; smooth to slightly roughened below; margins roughened; rolled at emergence.

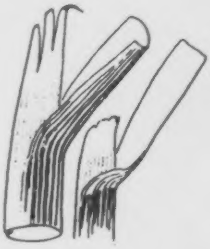
Sheaths: Rounded, split, margins pale, veins prominent, hairless (rarely roughened), **yellowish basally**.

Ligules: **3-8 mm. long** (averaging 5 mm.), delicate-membranous, truncate, lacerate, often irregularly split.

Collars: Continuous or divided, indistinct, mostly hairless, **yellow-green**; often oblique.

Auricles: Absent.

Heads: Panicles usually **loose, open, 2 cm. wide or more**, sometimes somewhat contracted; glumes purplish to greenish, 3-4 mm. long, pointed to long-pointed, roughened on keel; lemma with **straight awn** attached just below the middle, awns **not much longer than glumes** and usually **not exserted**; callus hairs **uniformly as long as lemmas** except for a short outer ring of hairs.



Other Species:

1. ***Phragmites australis*** (Cav.) Trin. *ex* Steud. - Reed; Cane Grass
Found in marshes, on shores in the boreal forest where locally abundant in some areas. A large and impressive grass, valued as providing habitat for wetland wildlife, also for its soil stabilizing properties.

Distinguished as follows:
- Stout plants to 3 m. tall.
- Plants from stout rhizomes, also stoloniferous.
- Sheaths overlapping, the lower purplish.
- Ligules a fringe of hairs.
- Blades 1-3 cm. wide, flat, to 40 cm. long.
- Blades glabrous, with paler, scabrous margins.
- Panicles 1-4 dm. long, plume-like, often purplish.
- Spikelets 12-15 mm. long, several-flowered.
- Rachilla with long silky hairs.
- Lemmas 8-12 mm. long, 3-nerved, glabrous, narrow, pointed.

Note: Illustration on page iv.

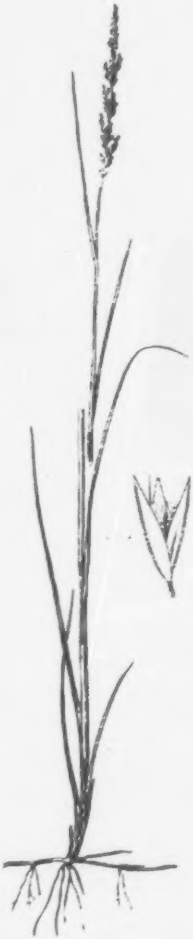
Habitat & Distribution: Absent from the prairies, common elsewhere.
Grows in swamps, edges of wetlands, moister upland sites, in moist woods.
On upland foothills sites, an indicator of mixedwood or predominantly deciduous ecosites.

Forage Value: Fair, nutritional quality generally moderate in early spring, and declining as the season advances; *C. canadensis* is most palatable (especially the leaves) in the spring, but is avoided later in the season unless little other forage is available; in areas where it forms dominant cover, marsh reed grass is rated as an important species, and is known to make fair quality native hay when cut early.

Grazing Response: Decreases with heavy grazing and trampling in some areas, otherwise an increaser #I, as it reproduces readily by both rhizomes and seed, and is often left ungrazed if more palatable forage is available.

Notes: From the Greek *kalamos* (reed) and *agrostis* (grass); *canadensis*, because the first N. American discovery was in Canada; also known as Canada reed grass, marsh or meadow pine grass; *C. canadensis* is an important species in wooded regions, tolerant of acid soils, establishing fairly quickly and with good soil stabilization properties; preliminary tests indicate good germination, although the light, fluffy seed is difficult to handle with conventional machinery; as with other strongly rhizomatous plants, it is a potential species for propagation by root sprigs.

Calamagrostis inexpansa A. Gray - Northern Reed Grass



Growth Habit: Perennials, tufted but also with **slender rhizomes, culms roughened**, 4-10 dm. tall.

Blades: Flat to inrolled, **firm, to 4 mm. wide** and 10-20 cm. long, medium to light green, ridged and **roughened above, smooth to roughened below**, margins roughened; rolled at emergence.

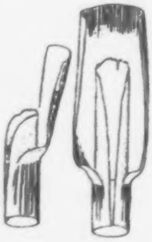
Sheaths: Rounded to slightly compressed, split, margins pale and overlapping, veins prominent; sometimes purplish basally.

Ligules: **4-7 mm. long**, blunt to truncate, sometimes lacerate or **slightly jagged-hair-fringed**.

Collars: Continuous or divided, indistinct, hairless, yellowish-green, oblique.

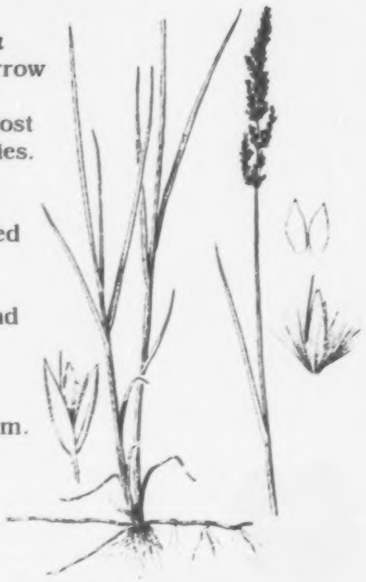
Auricles: Absent.

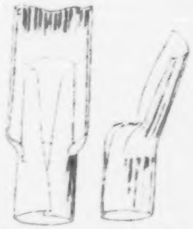
Heads: Panicle **contracted and lobed, 10-15 mm. broad when pressed**, 5-15 cm. long, pale green or sometimes purple-tinged; glumes **3-4 mm. long**, long-pointed, slightly roughened on keel; lemmas roughened, nearly as long as glumes; awns **straight, included**, arising from just below the middle; callus hairs **½ to ¾ lemma length**.



Similar Species:

1. ***Calamagrostis stricta*** (Timm) Koeler - Narrow Reed Grass
   Scattered throughout most regions except the prairies. Differs as follows:
   - Culms smooth, sometimes roughened just below heads.
   - Blades more lax, roughened at tips and on margins, sometimes slightly roughened above.
   - Ligules short, 1-2 mm. long, lacerate and more conspicuously hair-fringed.
   - Panicles more contracted.
   - Glumes 2-3 mm. long.





Habitat & Distribution: Found throughout in moist areas. Grows in marshes, sloughs, low grassland.

Forage Value: Fair, protein content 17-19% in the spring, dropping to 7% by August, and phosphorus content is relatively high, about 0.2% early in the season; northern reed grass is a moderately palatable species, especially early and also in late season when upland grasses become dry and brittle; leafy growth is most attractive, the stems usually left ungrazed.

Grazing Response: A decreaser when livestock use wetlands extensively, otherwise an increaser #1; as seed heads are usually ungrazed, and because plants reproduce rapidly from rhizomes, the species has a reproductive advantage when more palatable grasses decline.

Notes: *Inexpansa*, probably a reference to the unexpanded panicle; also known as marsh reed grass; northern reed grass is recommended as a reclamation species as it has the ability to quickly stabilize loose, wet soil; as with most *Calamagrostis* species, it is best propagated by root cuttings if soil is dry enough to support machinery; seed crops can be grown on upland sites in areas with good soils and high annual precipitation.

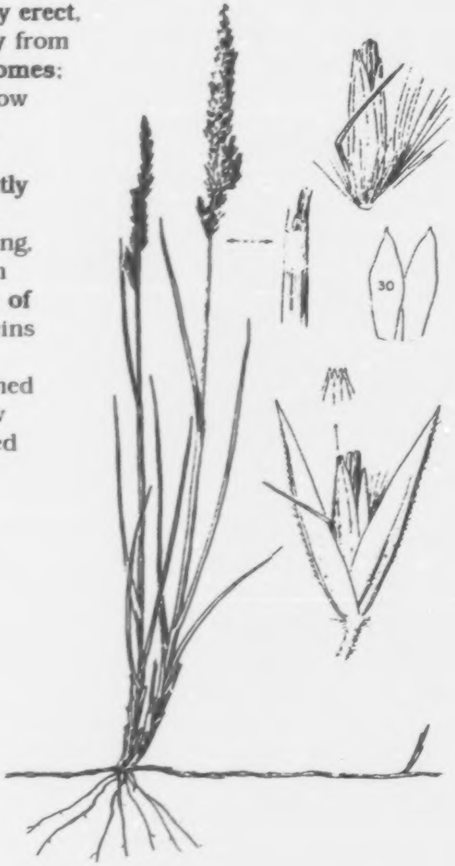
Calamagrostis montanensis Scribn. - Plains Reed Grass

Growth Habit: Perennial; culms **very erect**, usually **arising singly** from **deep extensive rhizomes**; culms roughened below panicle, 2-4 dm. tall.

Blades: Flat to inrolled, **strictly erect**, to 3 mm. wide and from 5-20 cm. long, **blue-green**, and often **purplish at junction of sheath and blade**, veins forming prominent ridges above; roughened both above and below and on margins; rolled at emergence.

Sheaths: Round, split, the margins pale, veins prominent, the midvein extending down sheath; light green, roughened.

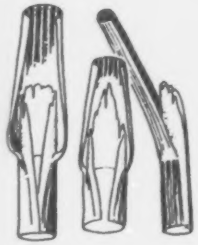
Ligules: **To 7 mm. long, conspicuous**, membranous, **pointed, entire or lacerate with age**.



Collars: Indistinct, hairless, light to brownish-green.

Auricles: Absent.

Heads: Panicles **compressed**, only slightly lobed; glumes **4-5 mm. long**, long-pointed, **keeled**, roughened on keel and usually over back; lemmas awned about 1-1.7 mm. above base, the awn **about the length as glumes, abruptly bent, exserted sidewise**; callus hairs ½ as long as lemmas, sparse.



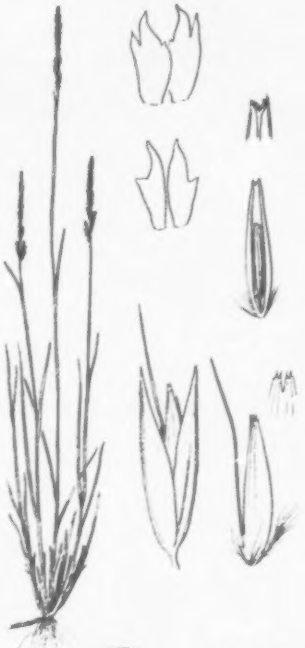
Habitat & Distribution: Common, more frequent in southern regions where it is a component of almost all grasslands.
Found in grasslands, open woods, and establishes quickly on disturbances.

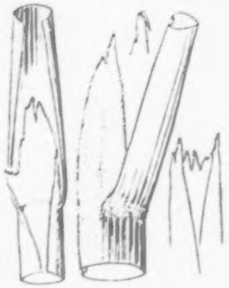
Forage Value: Fair, protein content at about 12% in early spring, decreasing to 9% by mid-summer; plains reed grass is moderately palatable before the boot stage for cattle and horses, less so for sheep; overall ratings fall somewhat below those of many range grasses primarily because only a small amount of forage is produced.

Grazing Response: An increaser #I except in badlands and on river breaks; plains reed grass is an opportunist, moving in rapidly on disturbances, but otherwise seldom dominant, and rarely forms dense stands.

Notes: The name "montanensis" is a reference to Montana, about the centre of the species' distribution; *C. montanensis* is an excellent species for quickly stabilizing upland sites, and is adapted to a wide range of soils and moisture conditions; it forms continuous stands in reclamation trials, but quickly becomes root-bound and produces few flowering shoots, thus is best propagated by root sprigs.

Calamagrostis purpurascens R. Br. ssp. *purpurascens* - Purple Reed Grass





Growth Habit: **Tufted perennials**, sometimes with short thick rhizomes; culms 3-7 dm. tall.

Blades: Flat to involute, 2-4 mm. broad, **scabrous**, at least above; rolled at emergence.

Sheaths: Round, usually rough-scabrous, veins distinct, margins pale, **basal ones usually purplish**.

Ligules: **2-5 mm. long**, membranous, **unevenly and deeply lacerate**, ciliate, the sides often higher than the back, **pubescent across back**.

Collars: Divided by midvein, medium broad, pubescent-scabrous.

Auricles: Absent.

Heads: Panicles 4-12 cm. long, congested, **tinged with red or purple**; glumes **5-8 mm. long**, scabrous; lemmas about 1 mm. shorter than glumes, 4-toothed at apex, callus hairs about 1.5 mm. long, awned from 1.5 mm. above base; awns twisted, **bent, exserted from glumes for about 2 mm**.

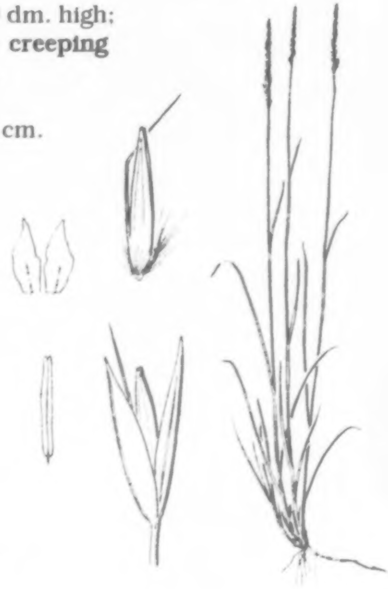
Habitat & Distribution: Restricted to the foothills/Rocky Mountain region, also in some isolated areas in the northern boreal forest.
Found in fescue grassland, on slopes, in open woods, often locally abundant on calcareous, rocky slopes.

Forage Value: Fair, grazed by livestock and game primarily early in the season, becoming less palatable and often ungrazed in the summer and fall unless alternative forage is scarce.

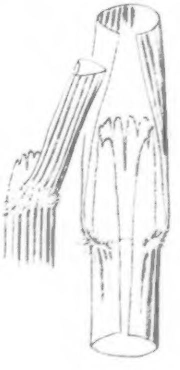
Grazing Response: An increaser #1, also decreases in areas where the species forms dominant cover as part of the climax vegetation, and, as such, becomes a primary forage plant.

Notes: Also known as purple pine grass; *purpurascens*, a reference to the purplish seed heads; purple reed grass is valued in revegetation work in calcareous montane areas where rocky, shallow soils would inhibit the growth of many other desirable species. Where best adapted, it is an important indigenous climax grass.

Calamagrostis rubescens Buckl. - Pine Grass



Growth Habit:	Perennials, with culms 6-9 dm. high; **tufted** but **with extensive creeping rhizomes**; culms **smooth**.
Blades:	Flat, 2-4 mm. broad to 30 cm. long **lax, drooping, scabrous on both surfaces**; margins scabrous, and often crisp-hairy basally; rolled at emergence.
Sheaths:	Round, split, margins scarious, veins distinct, often purplish at base, scabrous.
Ligules:	1-4 mm. long, blunt to acute, erose-ciliate, lacerate with age, sparsely pubescent across back.
Collars:	Divided by midrib, **distinct, pubescent with long, soft hairs, especially at the front**.
Auricles:	Absent.
Heads:	Panicles dense to somewhat loose, 4-15 cm. long, often lobed; greenish white or purple-tinged; glumes **4-5 mm. long**, smooth, acuminate, **not strongly keeled**; lemma slightly shorter than glumes, the awn **twisted and bent, exserted from glumes up to 1 mm.**; callus hairs few, about 1/3 lemma length.
Habitat & Distribution:	Most common in the foothills/Rocky Mountain region. Also in Cypress Hills, and occasional northward. Grows in open woods, on slopes. Especially common in lodgepole pine woods, mesic, medium-rich mixedwood and conifer forests.



Forage Value: Fair, often readily eaten early in the season, but becoming harsh and tough by summer and rather sparingly consumed if more palatable forage is abundant; essential nutrient levels rate somewhat below those of choice range species, with protein content at 10-20% in the spring and dropping to less than 5% by fall; pine grass can be an important forage plant in cases where it forms dominant cover and better quality species are scarce.

Grazing Response: An increaser, very resistant to trampling, also spreading rapidly by rhizomes; populations can tend to decline, however, in clear cuts in favour of species with superior adaptations. Heavy utilization of woodland pastures can initially cause serious decline in prominence of more palatable species while more or less maintaining the pine grass stand in good condition.

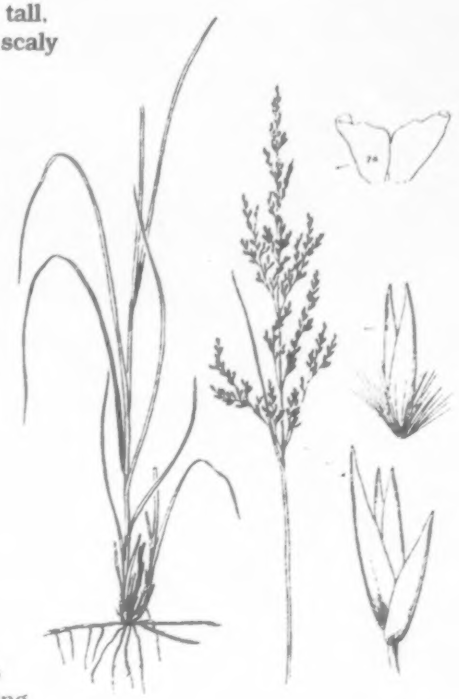
Notes: Also known as pine or red reed grass, the former because of the species' association with pine forests, the latter (and the term *rubescens*) a reference to the reddish seed heads and foliage; the extensive sod-forming root system makes pine grass one of our more important soil protection species, watershed problems occurring when extensive disturbance significantly reduces or eliminates populations; as with most strongly rhizomatous grasses, however, more subtle site changes such as those that occur with most burns, logging and scarification, serve only to increase vegetative responses in the plants, and reduction of tree canopy will stimulate increased flowering.

CALAMOVILFA (Gray) Hack. - Sand Grass

Common Characteristics

- Stout rhizomatous perennials.
- Ligule a fringe of hairs.
- Spikelets 6-7 mm. long, 1-flowered, lemma bearded basally.

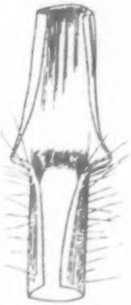
Calamovilfa longifolia (Hook.) Scribn. - Sand Grass



Growth Habit: Perennial, **8-12 dm. tall**, forming **long, thick scaly rhizomes**.

Blades: Flat (to inrolled), **firm, spreading, thick and firm and persistent**, long-pointed, **to 12 mm. wide** and 10-50 cm. long, often curled with age, light green, veins not prominent, both surfaces smooth, margins slightly roughened and pale; rolled at emergence.

Sheaths: Round, split, usually smooth, light green, **pinkish at the base**; margins pale, much overlapping at base.



Ligules: A **ring of hairs, to 3 mm. long**.

Collars: Continuous, distinct, broad, yellowish, with **tufts of hairs on inner margins**.

Auricles: Absent.

Heads: Panicles to 4 dm. long, narrow to somewhat spreading; spikelets stalked, **1-flowered**, pale to purplish, **6-7 mm. long**; glumes 4-7 mm. long, 1-nerved; lemmas hairless, 4-7 mm. long with **conspicuous callus hairs** more than half the lemma length.

Habitat & Distribution: Common in the prairies, also found on suitable sites in the parkland and foothills regions.
Grows in all types of sandy areas: in dunes, stabilized grasslands, disturbances, in open woods. Often associated with *Sporobolus cryptandrus*.

Forage Value: Fair, protein content averaging about 16% in May, dropping to about 4% by November; crude fiber ratings remain fairly constant, available carbohydrates increasing from about 45% to 55% between May and October and ash content is relatively low; plants cure on the stem, the species generally considered good winter pasture; sand grass is palatable during the first month of growth and after curing, seed heads (but not stems) also readily eaten.

Grazing Response: An increaser #1 in most areas except on badland breaks where it generally decreases with moderate use; heavy utilization and excessive trampling can cause stands to decline or even disappear.

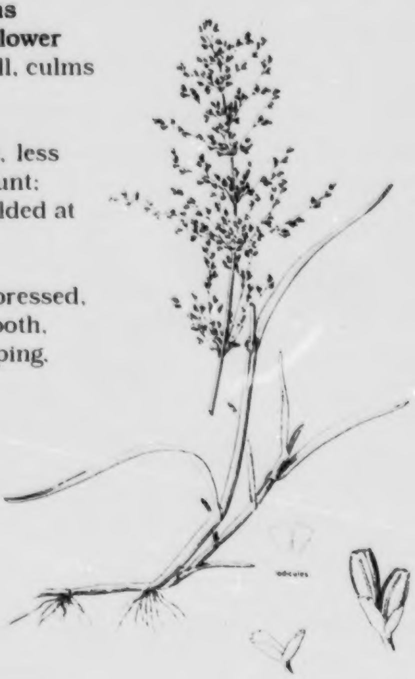
Notes: From the Greek *kalamos*, reed, and *Vilfa*, another genus of *Gramineae*; also known as prairie sand grass, prairie sand reed; *C. longifolia* is a valuable reclamation species, the aggressive root system capable of binding and stabilizing loose sandy soil; because seed is difficult to handle, and the species is reputed to have poor germination, it is probably most successfully propagated by root sprigs.

CATABROSA Beauv. - Brook Grass

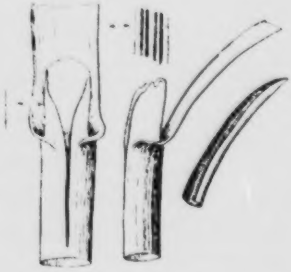
Common Characteristics

- Aquatic perennials.
- Ligules long, conspicuous.
- Spikelets 2-flowered; glumes shorter than lemmas.
- Lemmas truncate and jagged at tips, strongly 3-nerved.

Catabrosa aquatica (L.) Beauv. - Brook Grass



Growth Habit:	**Aquatic perennial, stems reclining, rooting from lower nodes**; plants 1-4 dm. tall, culms ridged, glabrous.
Blades:	**Flat, lax, to 8 mm. wide**, less than 10 cm. long; tips blunt; smooth on both sides; folded at emergence.
Sheaths:	Rounded to slightly compressed, loose, split part way, smooth, margins hyaline, overlapping, base often purplish.
Ligules:	**To 8 mm. long**, obtuse, **jagged to entire**, minutely scabrous but not hairy.
Collars:	Continuous, distinct, narrow, glabrous, from lighter to darker than leaf blade.
Heads:	Panicles 1-2 dm. long, open, with whorls of branches; **glumes** 0.7-1.3 and 1.5-2.3 mm. long, **shorter than lemmas; spikelets 2-flowered, lemmas jagged-truncate and hyaline at apex, conspicuously 3-nerved**, 2.5-3 mm. long.



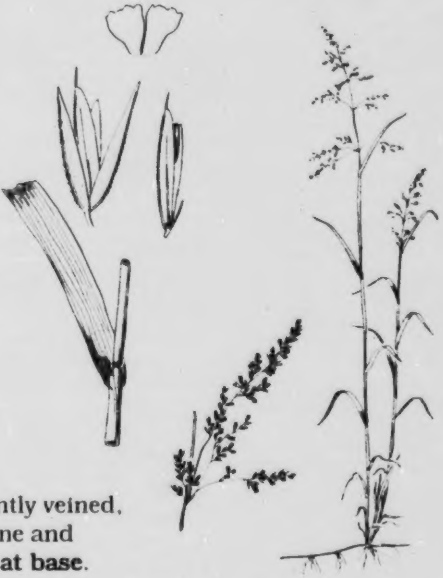
Habitat & Distribution:	Frequent in southern regions. A semi-aquatic species, often in shallow water. Grows in and along streams and springs.
Forage Value:	Fair; *Catabrosa* is palatable, the foliage lush and succulent, but rarely is in such abundance as to become a significant part of a permanent diet; as well; plants are often inaccessible due to aquatic habitat; when prominent , brook grass is a source of food for waterfowl.
Grazing Response:	An increaser, usually sparingly grazed and able to reproduce sufficiently to maintain stands; as well, the stoloniferous nature of the stems increases reproductive capacity; populations can decline in dry years when wetlands become more accessible.
Notes:	*Catabrosa*, Greek for devour, apparently referring to the erose-fringed lemma tips; one of two species globally, both of the Northern Hemisphere; brook grass functions to some extent in binding loose, wet soil along waterways, adapted to both shoreline habitats and areas where periodic or seasonal inundation occurs.

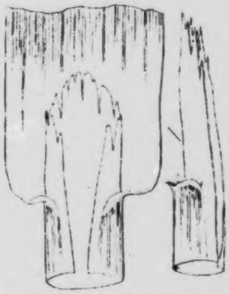
CINNA L. - Wood Reed

Common Characteristics

- Creeping perennials with bulbous bases.
- Florets short-stalked, disarticulating below glumes.
- Spikelets 1-flowered.

Cinna latifolia (Trev.) Griseb. - Drooping Wood Reed





Growth Habit:	Perennial, **6-12 dm. tall**, rhizomatous, sometimes bulbous at base.
Blades:	**Flat**, acuminate, **to 12 mm. wide** and 10-25 cm. long, **finely scabrous on both surfaces**, thin; veins unequally sized; midrib prominent, extending part way down sheath; rolled at emergence.
Sheaths:	Round, split, prominently veined, smooth, margins hyaline and overlapping, **purplish at base**.
Ligules:	**To 10 mm. long, obtuse**, membranous, **usually lacerate**.
Collars:	Divided, distinct, glabrous, **purplish to dark brown**.
Auricles:	Absent.
Heads:	Panicles 15-30 cm. long, **loose, branches clustered and drooping**; glumes somewhat scabrous, 3-4 mm. long; **spikelets short-stalked, 1-flowered, the entire spikelet falling at maturity**; lemmas 3-nerved, 2-3.2 mm. long, finely hairy across back, awnless or with subterminal awn to 1 mm. long.

Habitat & Distribution: Occasional throughout most regions, absent from the prairies. Found in moist woods, in clearings.

Forage Value: Fair to poor, apparently somewhat palatable, especially in early growth stages, but populations are seldom prominent enough on stable sites to supply significant amounts of forage.

Grazing Response: An increaser.

Notes: From the Greek *kinni*, a traditional name of a grass, *latifolia* a reference to the broad leaves; although often overlooked because of its rather sporadic occurrences, wood reed is a very attractive woodland plant and can be appreciated for its aesthetic value alone; it has potential as an ornamental grass for moist, shaded gardens; *Cinna* responds as an early successional species on disturbance but also persists in a closed canopy and although often not abundant, shows exceptional adaptations to a wide variety of environmental conditions; for these reasons it is a key species to be included in re-vegetation projects in wooded regions.

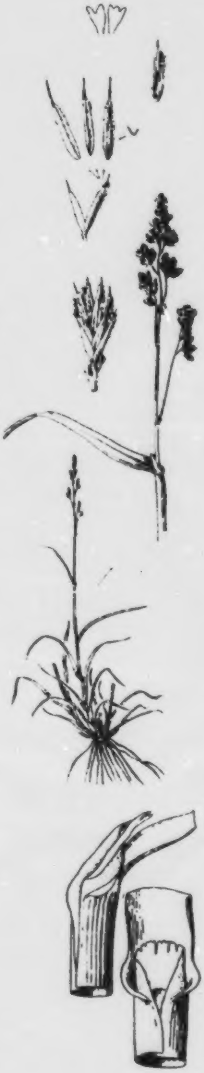
DACTYLIS L. - Orchard Grass

Common Characteristics

- Tufted perennials with broad, succulent leaves with boat-shaped tips.
- Sheaths compressed.
- Spikelets several-flowered, in 1-sided clusters.

Dactylis glomerata L. - Orchard Grass

Growth Habit:	**Tufted** perennial, without rhizomes, culms 6-10 dm. tall.
Blades:	**Flat to folded, succulent, to 10 mm. wide**, 5-25 cm. long, **boat-shaped at tip; pale green, often glaucous**, veins not prominent but roughened; midrib with a distinct, deep furrow; margins pale, roughened: folded at emergence.
Sheaths:	**Distinctly flattened, keeled,** split part way, finely veined, hairless, pale green to purplish.
Ligules:	**To 8 mm. long**, membranous, truncate, bristle tipped to blunt, **hair-fringed** and often lacerate.
Collars:	Divided, broad, hairless, yellowish.
Auricles:	Absent.
Heads:	Panicles 5-20 cm. long, of **dense one-sided compressed spikelet clusters at ends of branches**; spikelets 3-6 flowered; glumes 4-6 mm. long, unequal, long-pointed, keeled, bristly-hairy; lemmas 5-8 mm. long, obscurely 5-nerved, hair-fringed on keel, short-pointed.
Habitat & Distribution:	Introduced as a forage species. Frequent, especially southward, occasional as an escape.



Forage Value:	Good until maturity, after which nutritional levels drop rather rapidly, making poor quality fall and winter pasture; orchard grass makes good hay when grown with legumes and cut early, but requires adequate rainfall (500-650 mm. annually) and nitrogen fertilizer to maintain good yields; plants also respond well in irrigated pastures and hay fields, and both pasture and hay are palatable to livestock and game.
Grazing Response:	An invader, native to Europe, often found as an escape but not invasive.
Notes:	From the Greek *daktulos*, finger, probably alluding to the stiff panicle, *glomerata* referring to the arrangement of flowers in clusters; *D. glomerata* is adapted to moist regions (except the extreme north where it is prone to winter kill), and to moderately acidic soils, where it is often used in reclamation and range improvement projects; the species is tolerant of some flooding but will not survive long periods of inundation; in native rangeland, however, native species should be substituted whenever possible, or at least be included in a mix along with orchard grass.

DANTHONIA Lam. & DC. - Oat Grass

Common Characteristics

- Tufted perennials, without rhizomes.
- Ligule a tuft of hairs.
- Inflorescence a panicle of several (sometimes one), rather large spikelets.
- Glumes as long as and covering the 3-8 florets.
- Lemmas 2-toothed at top, a twisted awn from between teeth.

Key to Danthonia

1. Panicles reduced to a single spikelet (rarely 2 or 3); upper leaf surface often more hairy than lower. *D. unispicata*

Panicles of 2 or more spikelets. 2

2. Lemmas hairy across the back; leaves nearly glabrous except at throat, sometimes with a few hairs below. *D. parryi*

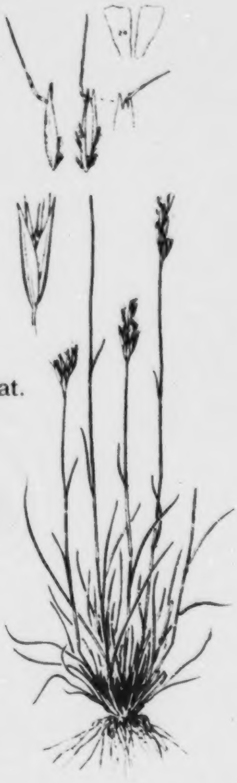
Lemmas hairy only along margins. 3

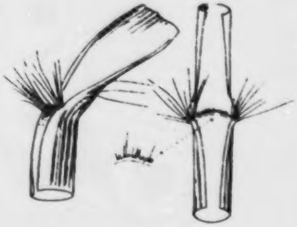
3. Spikelets on spreading, reflexed stalks 1-2 cm. long, these kinked and flexible, leaves more hairy above than below. *D. californica*

Spikelets on short, ascending stalks, panicles appressed; leaves more hairy below than above. *D. intermedia*

Danthonia intermedia Vasey - Intermediate Oat Grass; Timber Oat Grass

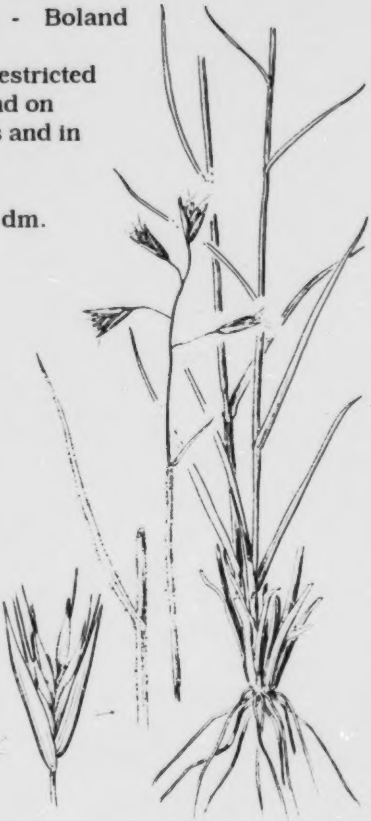
Growth Habit:	**Tufted** perennials with fibrous roots, growing **to 4 dm. in height**.
Blades:	To 3 mm. wide and to 15 cm. long, flat to inrolled, long-pointed, light green, upper surface ridged and **somewhat hairy**, lower surface **conspicuously long hairy**; margins pale, slightly roughened; folded at emergence.
Sheaths:	Round, split, margins pale green; veins conspicuous; **very long soft-hairy**, and with long hairs at the throat.
Ligules:	A **fringe of hairs**, to 1 mm. long.
Collars:	Distinct, narrow, yellow-green, continuous, with long hairs all around and on margins.
Auricles:	Absent.
Heads:	Panicle **appressed, ascending**, 3-9 cm. long, branches each bearing a single spikelet; glumes 10-18 mm. long; lemmas 8-12 mm. long, **long soft-hairy on lower margins and on callus**, roughened above; awns 5-10 mm. long.

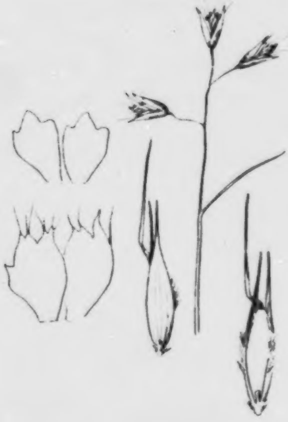


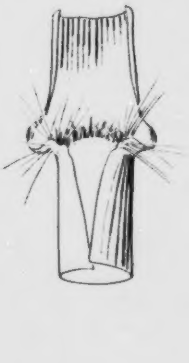


Similar Species:

1. ***Danthonia californica*** - Boland
California Oat Grass
An uncommon species, restricted to southern regions, found on moist slopes and coulees and in depressional grassland.
Differs as follows:
   - Somewhat taller, 3-8 dm. tall.
   - Leaves more hairy above, roughened and somewhat hairy below.
   - Spikelets on spreading to reflexed stalks, these kinked and flexible, 1-2 cm. long.
   - Stalks with a prominent swelling at base.





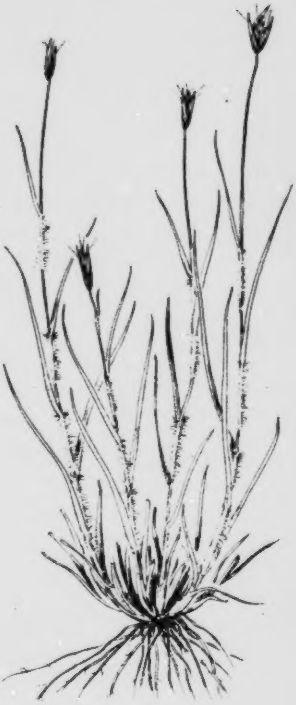


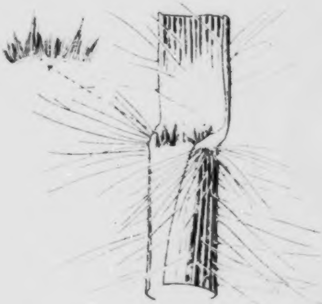
2. ***Danthonia unispicata*** (Thurb.) Monro - One-spike Oat Grass

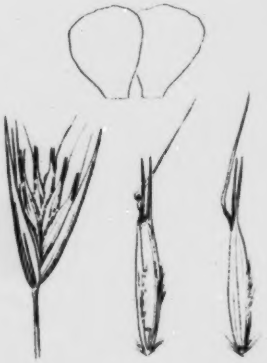
Uncommon, found in southern regions, on rocky ridges in the foothills in depressional grassland in the prairies.

Distinguishing characteristics:

- Plants to 3 dm. tall.
- Upper leaf surface more hairy than the lower, the hairs long and spreading.
- Collar hairs especially long and conspicuous.
- Sheaths with long, reflexed hairs.
- Upper sheaths slightly swollen, purplish.
- Spikelets mostly solitary.
- Lemmas only hairy on lower margins and callus.







Habitat & Distribution: Common, found in all Ecoregions.
Found in moist/depressional areas in grasslands, in open woods.

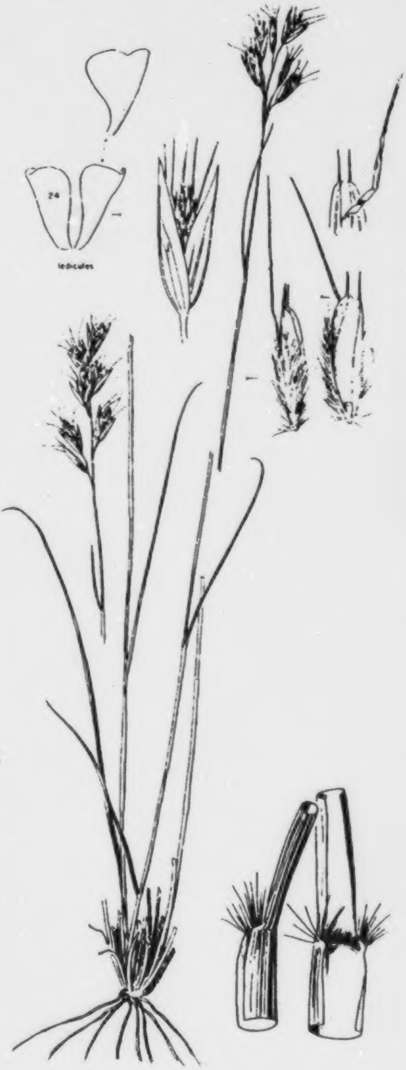
Forage Value: Good, although protein and phosphorus content are somewhat lower, and crude fiber ratings somewhat higher than those of many other native species; as well, foliage cures on the stem, making useful late season pasture; *D. intermedia* is palatable early in the season when plants grow rapidly, but less so by summer when other grasses become abundant; in overgrazed fescue grasslands, intermediate oat grass will often be left ungrazed until all other forage has been consumed. *Note:* The closely related *D. californica* is relished throughout the season by livestock, its lush growth often preferred over other available species.

Grazing Response: An increaser #1; plants withstand fairly heavy grazing and trampling, this perhaps because they are often less palatable than associated species; intermediate oat grass is especially well adapted to spreading by seed, as the hidden fertile spikelets are usually left ungrazed, and it spreads to some extent by stooling; high palatability of *D. californica* may be at least partially responsible for its low prominence in most rangelands.

Notes: Named for Etienne Danthione, a French botanist of the early nineteenth century; although not valued to the same extent as Parry oat grass, *D. intermedia* and the less common *D. californica* are important components of native mixes, recommended in order to maintain species diversity; they are difficult species to propagate, as only small amounts of seed are produced and hairs and awns make it difficult to handle with conventional machinery.

Danthonia parryi Scribn. - Parry Oat Grass

Growth Habit:	**Densely tufted** perennials with fibrous roots; culms hairless, 3-6 dm. tall.
Blades:	To 3 mm. wide, and 10-25 cm. long, yellow-green, flat to inrolled, **narrow to very slender, the tips curled, turning pale; upper surface roughened**, margins pale; **lower surface mostly hairless; old blades breaking off at collar**; veins above distinct but midribs obscure; folded at emergence.
Sheaths:	Rounded, split, hairless, ridged at top; **yellowish, swollen**, overlapping, **firm and persistent at base**; margins overlapping, pale; hairy at the throat.
Ligules:	To 0.5 mm. long, a **fringe of hairs**.
Collars:	A narrow, thick continuous ridge, this ridge sometimes hairy; margins with tufts of hairs.
Auricles:	Absent.



Heads: Panicle erect or ascending, pale straw-colored with age, 3-7 cm. long; panicles with 3-8 spikelets, panicle branches hairy; **glumes 20-22 mm. long,** lemmas about 1 cm. long, with awns 11-15 mm. long; lemmas **hairy across the back and strongly long soft-hairy on margins and callus**.

Habitat & Distribution: Restricted southern foothills and montane Ecoregions. Grows in fescue grassland, tending to occupy drier sites, slopes and ridge tops where an indicator of subxeric conditions.

Forage Value: Good, with nutrients in good balance, protein content somewhat lower in the spring than many prairie species, but higher during summer and fall; plants cure on the stem, providing good winter pasture; palatability ratings vary, generally considered moderate.

Grazing Response: An increaser #I; *D. parryi* is adapted to resist heavy grazing and trampling as well as fire, the persistent basal sheaths protect new growth and also produce hidden fertile spikelets. Parry oat grass, along with associated species, will replace rough fescue on subxeric sites, and in these cases can be considered part of more or less stable late phase, good condition communities.

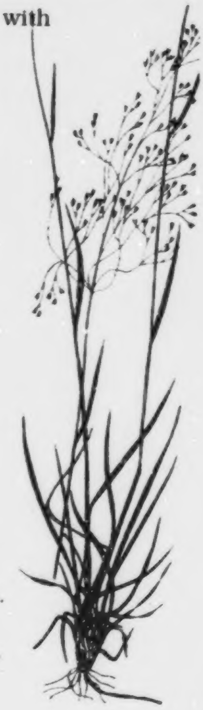
Notes: *D. parryi* is useful in re-seeding drier, exposed slopes in the foothills region; like intermediate oat grass, it is difficult to propagate, as little fertile seed is produced, and is difficult to handle because of the awns.

DESCHAMPSIA Beauv. - Hair Grass

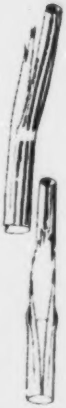
Common Characteristics

- Mostly perennials, tufted with fibrous roots.
- Spikelets stalked, 2-flowered.
- Glumes about as long as lemmas.
- Lemmas truncate and 2-4 toothed at top, bearded at base, slender-awned from below middle; rachilla prolonged beyond the upper floret.

Deschampsia caespitosa (L.) Beauv. - Tufted Hair Grass



Growth Habit:	Perennial, forming large, **dense tufts**, with fibrous roots; **2-12 dm. tall**.
Blades:	**Numerous, mostly basal, to 5 mm. wide**, 5-30 cm. long, flat to folded, **firm**, bristle-like, sometimes flexible; **roughened** and with **prominent raised veins above**, smooth to slightly roughened below; light green to translucent between veins; margins roughened; folded at emergence.
Sheaths:	**Compressed, keeled**, hairless to roughened, prominently veined, split, **light green or straw-colored**; margins pale, overlapping.
Ligules:	**To 10 mm. long, very conspicuous**, membranous, long-pointed, entire or sometimes split, **hairy across back**, continuous with margins of the sheath.
Collars:	Narrow, divided, sometimes indistinct, yellowish-green to brownish, **with a conspicuous swelling at each end**.
Auricles:	Absent.
Heads:	Panicle loose, nodding, **open**, 10-25 cm. long; fine, hair-like branches bearing spikelets toward their tips; spikelets 2-flowered, 4-5 mm. long, **pale to purple-tinged, shiny**; glumes nearly as long as lemmas, 3-4.5 mm. long, **lemmas jaggedly 4-toothed**, and **awned from near the base**; lemmas smooth but **with callus hairs** about 1 mm. long.



Habitat & Distribution: Common throughout most regions.
Found in moist meadows, on slough margins, in boggy areas.

Forage Value: Good, protein content as high as 18% in May, decreasing to about 7% by August; fiber is relatively low, and phosphorus content higher than average; *D. caespitosa* is generally palatable to both game and livestock throughout the season as foliage remains green; however, very lush growth and mature, wiry leaves are sometimes grazed rather sparingly; tufted hair grass produces fairly good native hay.

Grazing Response: A decreaser; although plants stool to some extent, they are relatively short lived, and depend primarily upon seed for reproduction.

Notes: Named for Jean Louis Auguste Loiseleur Deslongchamps, a French botanist, 1774-1849; *caespitosa* a reference to the tufted habit; tufted hair grass is considered a valuable native species in reclamation work in wet, moderately acidic areas; seed, however, is in short supply, very expensive, and is difficult to handle with conventional machinery; the species has a world-wide distribution and genetic material originating in Europe is currently available; as with all natives, however, locally developed cultivars are preferred over imported stock.

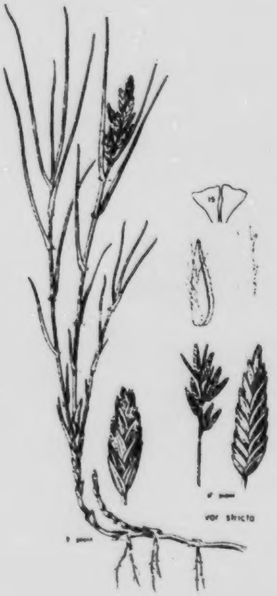
DISTICHLIS Raf. - Salt Grass

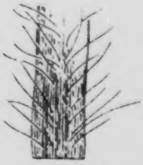
Common Characteristics

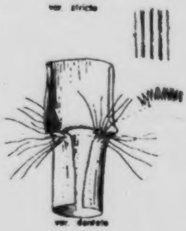
- Low perennials of saline or alkaline habitats.
- Plants from thick, scaly yellowish-white rhizomes.
- Ligule a ring of hairs.
- Male and female flowers on separate plants.
- Spikelets several flowered, stalked, glumes shorter than lemmas.

Distichlis stricta (Torr.) Rydb. - Salt Grass

Growth Habit:	Perennials growing from **extensive yellowish-white, scaly rhizomes**; culms somewhat stoloniferous, 1-4 dm. tall.
Blades:	Leaves to 4 mm. wide, **stiffly rigid**, 1-15 cm. long, with sharp tips; arranged in 2 vertical rows, roughened above, often with a few long hairs at the base, smooth below, roughened on margins; **lower leaves few, short, overlapping**; upper leaves more numerous, longer; folded at emergence.
Sheaths:	Round, split, usually hairless, basal ones usually yellowish, closely overlapping; margins overlapping, **pale**.
Ligules:	A **fringe of hairs** to 0.5 mm. long.
Collars:	Narrow, continuous, distinct, yellowish, margins with tufts of long hairs.
Auricles:	Absent.
Heads:	Inflorescence a small panicle, spikelets large, **compressed**; **staminate spikelets** thickened, **yellowish**, 1-1.5 cm. long; **pistillate spikelets more membranous**, greener, less flattened, 0.5-1 cm. long, lemmas **overlapping**, becoming firm; paleas wing-keeled.







Habitat & Distribution:	Common in the prairies and parkland, occasional elsewhere. Usually restricted to, and an indicator of, low lying, depressional alkaline or saline areas.
Forage Value:	Poor, this rating based more on low palatability than actual nutrient content, protein and phosphorus being average, crude fiber low, and available carbohydrates relatively high; due to tough, wiry foliage, plants are only consumed when more palatable species are unavailable.
Grazing Response:	An increaser, spreading readily by rhizomes, often opportunistic when other forage is grazed out.
Notes:	From the Greek *distichos*, a reference to the distichous (2-ranked) leaves; also known as desert salt grass, alkali grass; *D. stricta* is valuable for revegetating areas with moderate to rather poor fertility, and too saline or alkaline to support other vegetation; a poor seed producer, the species is probably best propagated by root sprigs.

ELYMUS L. - Wild Rye

Common Characteristics

- Mostly robust perennials, some with rhizomes.
- Spikelets sessile, in spikes.
- Spikelets usually two per node, similar.
- Axis not disarticulating at maturity.

Key to Elymus

1. Creeping rhizomes present; spikelets usually hairy 2

Creeping rhizomes lacking, spikelets hairless to somewhat hairy but not densely so. 4

2. Spikes 5-10 cm. long, often purplish; lemmas densely hairy; woodland plants to 9 dm. tall. *E. innovatus*

Spikes and lemmas not both purplish and densely hairy. 3

3. Tall plants 2-3 m. high; spikes 10-25 cm. long. *E. piperi*

Plants 5-9 dm. tall; spikes 5-15 cm. long. *Agroelymus hirtiflorus*

4. Glumes very narrow, barely widened above base 5

Glumes narrowly lanceolate, somewhat broader above the base 7

5. Plants to 10 dm. tall; leaves to 5 mm. wide; ligules to 1 mm. long; spikes 5-10 cm. long; introduced. *E. junceus*

Plants 2-3 m. tall, blades to 15 mm. wide 6

6. Auricles to 3 mm. long; ligules to 2 mm. long; introduced. *E. angustus*

Auricles to 4 mm. long; ligules 3-7 mm. long; native. *E. piperi*

7. Spikes slender, about 1 cm. broad (including awns), breaking up at maturity or on drying; glumes very narrow, 1-3 nerved. *Agrohordeum macounii*

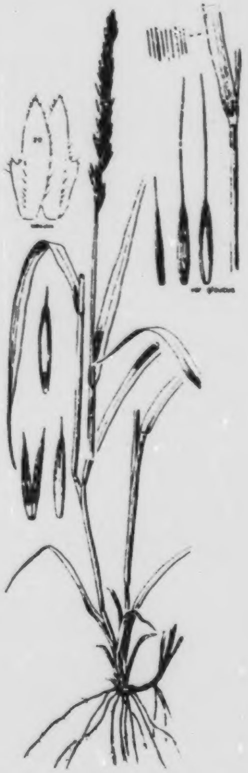
Spikes thicker, more than 1 cm. wide (including awns); spikelets not breaking up at maturity. 8

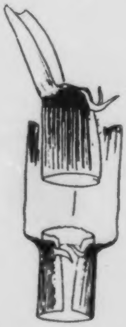
8. Glumes thin, not hardened, hairless to scabrous ; lemma awns 1-2 cm. long, straight, not curved; woodland species. *E. glaucus*

Glumes firm and hard, with pale, flattened bases; lemmas scabrous to somewhat hairy; lemma awns outward curved; prairie/parkland species. *E. canadensis*

Elymus glaucus Buckl. - Smooth Wild Rye

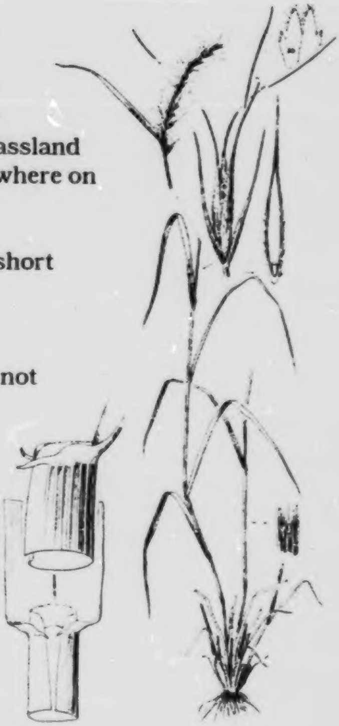
Growth Habit:	**Tufted** perennial with fibrous roots, 5-12 dm. tall.
Blades:	**To 15 mm. wide, flat** (rolled on drying), **glaucous**, lax, tapering, roughened above and below, sometimes sparsely coarse-hairy below; veins not prominent, margins pale and roughened; rolled at emergence.
Sheaths:	Round, split, smooth to roughened, rarely sparsely coarse-hairy, veins distinct, margins pale, overlapping.
Ligules:	0.5-2.0 mm. long, membranous, truncate, lacerate-jagged to somewhat hair-fringed.
Collars:	Narrow, continuous or sometimes divided, hairless, yellow to brownish-purple, often oblique, **margins thick and firm**.
Auricles:	Usually present, **to 4 mm. long**, clawlike, clasping.
Heads:	Spikes erect to slightly nodding, usually dense, 5-15 cm. long; spikelets usually 2 (1-3) per node; glumes **lanceolate**, broadest near base, 3-5 nerved, these roughened, short awn-tipped; glumes **thin, without hardened bases**; lemmas 3-5, **hairless or somewhat roughened**, rarely sparsely coarse-hairy; lemma awns **1-2 cm. long, straight**.





Similar Species:

1. ***Elymus canadensis*** L. - Canada Wild Rye
Frequent in the prairie and parkland regions, found on sandy soil, on shores, in grassland and dunes. Occasional elsewhere on suitable sites.
Differs as follows:
   - Plants often producing short rhizomes.
   - Collars broad.
   - Auricles to 2 mm. long.
   - Blades 4-20 mm. wide, not glaucous.
   - Glumes firm and hardened, the bases pale, flattened.
   - Lemmas roughened to somewhat hairy.
   - Awns outward-curved.



Habitat & Distribution:

Frequent in the foothills and montane Ecoregions, also a few occurrences in the parkland region.
Grows in moist woods and meadows.

Forage Value:

Fair, protein content somewhat lower and that of fiber higher than many range species; as well, *E. glaucus* does not cure on the stem, making poor winter feed; palatability early in the season is good but by mid-summer plants (especially seed heads) are consumed rather sparingly unless more desirable forage is unavailable; where it does form dominant cover, *E. glaucus* is rated as an important range species.

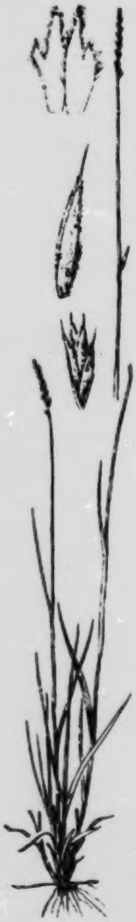
Grazing Response:

An increaser #1, populations tending to decline under continued heavy utilization.

Notes:

Elymus, from the Greek *elumos*, an ancient name for some kinds of grain, *glaucus*, a reference to the characteristic pale bluish color of the foliage; also known as blue, mountain, or western wild rye; smooth wild rye produces relatively large amounts of viable seed, often naturally reclaiming cut-over areas and old burns and is recommended as an early successional species in seed mixes for wooded regions; seed is relatively easy to handle with conventional machinery but requires de-bearding as part of the cleaning process.

Elymus innovatus Beal - Hairy Wild Rye Syn. *Leymus innovatus*



Growth Habit: Perennials **from slender brown-scaly rhizomes**; culms hairy below nodes and in inflorescence, 4-9 dm. tall.

Blades: To 12 mm. wide, 5-25 cm. long, 2-5 mm. wide, flat to rolled on drying, firm, long-pointed; **blue or yellow-green below, glaucous above,** roughened above and below and on margins; veins more prominent above; rolled at emergence.

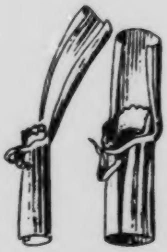
Sheaths: Round, split, lower roughened to minutely hairy, upper smooth; veins prominent; margins pale.

Ligules: **To 0.5 mm. long**, membranous, truncate, jagged-hair-fringed.

Collars: Indistinct, narrow, divided, light green.

Auricles: **To 2 mm. long, prominent**, clawlike.

Heads: Spikes 4-10 cm. long, dense, **purplish**; spikelets 3-5 flowered, usually in pairs; glumes **very narrow, hairy**; lemmas **long-hairy**, short awn tips 1-4 mm. long.

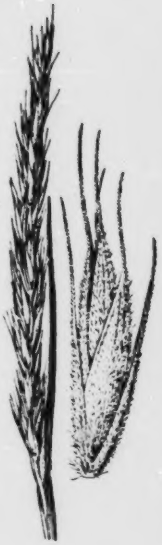


Related Species:

1. ***Elymus innovatus*** var. ***glabratus*** Bowden
   Differs in having spikelets mostly hairless.

Similar Species:

1. ***Agroelymus hirtiflorus*** (A.S. Hitchc.) Bowden
A sterile hybrid between *Agropyron trachycaulum* and *Elymus innovatus*. Common in the foothills/Rocky Mountain region, in the boreal forest. Sometimes associates with *Festuca altaica*, and in some regions can be considered locally abundant, reproducing readily by vegetative means.
Distinguished as follows:
    - Tufted plants, also with rhizomes.
    - Leaves firm, 1-4 mm. broad.
    - Spikes purplish, erect, to 15 cm. long, ascending, overlapping.
    - Glumes narrow, nearly equal, with awns the length of the body, hairy.
    - Lemmas hairy, 8 mm. long, with awns 5-10 mm. long.



Habitat & Distribution:

Common in foothills, montane and boreal forest Ecoregions, with some occurrences in the parkland region.
Grows in deciduous and coniferous forests, in montane grasslands.
In forested regions, high cover values often indicate subxeric-mesic sites.

Forage Value:

Traditionally considered poor, but recent studies indicate that cattle in pastures where hairy wild rye is prominent show good gains; as well, nutrients (including protein content) are comparable to those of rough fescue, rating as high as 18% in early August (these tests were performed on cultivated specimens, and it is probable that any species grown in the open rates more highly than those occurring under a tree canopy); palatability is generally only fair, due to coarseness and hairiness of foliage, but plants are readily consumed when other forage is not available; hairy wild rye is a major component of climax *F. altaica* grasslands, and often produces sterile hybrids with *A. trachycaulum*.

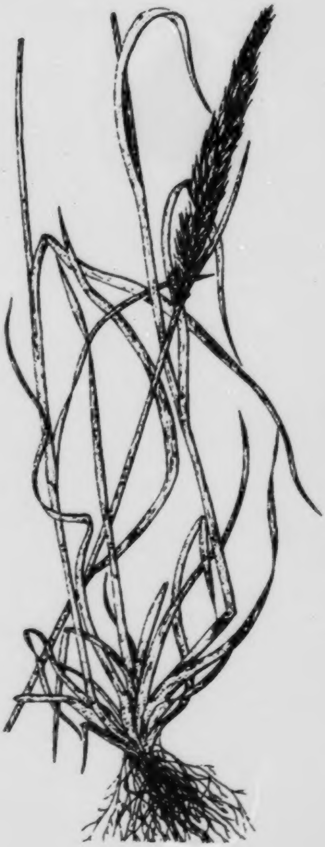
Grazing Response:

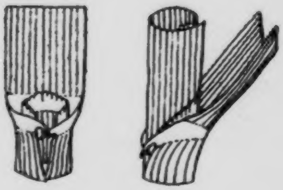
An increaser #1, tending to spread readily in clearings and disturbances, but often declining under a forest canopy if continuously and heavily grazed.

Notes: *E. innovatus* is an excellent species for revegetating forested regions, tolerant of moderately acidic soils and valuable in erosion control as plants spread quickly by rhizomes once established; hairy wild rye is often hard to grow from seed, as germination is sometimes low, and the light, hairy seed is difficult to handle; thus, it is a potential species for propagation by root cuttings.

Elymus junceus Fisch. - Russian Wild Rye Syn. *Psathyrostachys junceà*

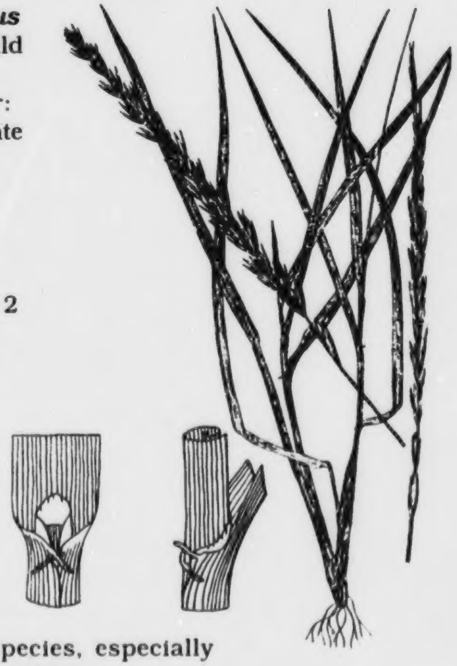
Growth Habit:	Deep-rooted **tufted** perennial; culms **4-10 dm.** tall.
Blades:	**To 5 mm. wide**, 5-25 cm. long, mostly basal; erect, roughened on both surfaces, flat to rolled, long-pointed, veins prominent, margins roughened; rolled at emergence.
Sheaths:	Round, split, prominently veined, smooth; margins overlapping, pale.
Ligules:	**To 1 mm. long,** membranous, blunt to truncate, lacerate, hair-fringed.
Collars:	Broad, continuous, hairless, yellow or light green.
Auricles:	To 2 mm. long, **conspicuous**, clawlike, clasping.
Heads:	Spikes **5-10 cm. long**, and to 1 cm. broad, erect; tending to disarticulate at maturity; **glumes very narrow**, 3-7 mm. long; lemmas **6-10 mm. long, usually roughened**; awns short, 0.5-2 mm. long.





Similar Species:

1. ***Elymus angustus*** Trin. - Altai Wild Rye
   Similar but larger:
   - Roots penetrate 3-4 m. deep.
   - Leaves to 15 mm. wide.
   - Auricles to 3 mm.
   - Ligules about 2 mm. long.
   - Heads 15-20 cm. long, spikelets twice to three times as long as those of Russian wild rye.



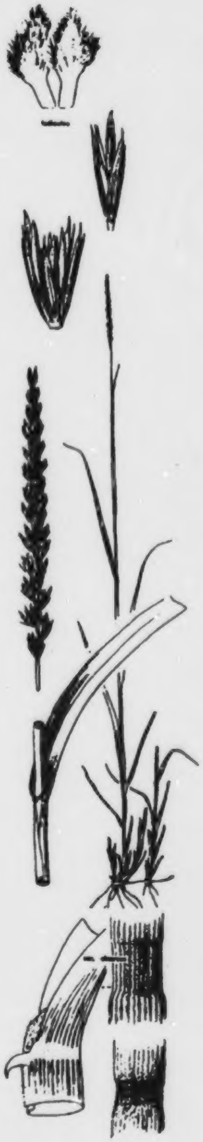
Habitat & Distribution: Introduced forage species, especially common in southern regions.

Forage Value: Good, protein content rated at 21% or more in early spring and plants remain more nutritious than many associated species during fall and winter, protein content often 7% or more and digestible carbohydrates remain above average; *E. junceus* is palatable throughout the season to both game and livestock, and also makes excellent fall and winter pasture; although Russian wild rye produces good quality, high yielding hay, it is difficult to cut, thus is primarily grown as a pasture species.

Grazing Response: An invader, introduced into North America from western Siberia, now common in the prairie region, but not considered invasive.

Notes: Also known as Russian wild rye grass; *E. junceus* is a useful species for soil stabilization, best adapted to loams and clays, also bentonitic clays and is tolerant of moderate alkalinity; Russian wild rye can be successfully grown in sandy soil if plants can establish before soil dries out; however, in native rangeland, indigenous grasses should be substituted whenever possible to maintain a native species composition.

Elymus piperi Bowden - Giant Wild Rye Syn. *Leymus cinereus*



Growth Habit:	**Tufted** perennials forming large clumps, with **short, thick knotted rhizomes; culms 2-3 m. tall**, and hairy at nodes, less so on rest of stem.
Blades:	**To 15 mm. wide** and **15-50 cm. long**, flat to rolled; long-pointed, strongly veined and roughened above, **roughened and less obviously veined below**; thick and stiff; margins roughened and pale; rolled at emergence.
Sheaths:	Round, split, veins fine but prominent, smooth to roughened, light green, base brownish to faintly purple; margins pale.
Ligules:	**3-7 mm. long**, membranous, blunt to truncate, lacerate, **hairy below**.
Collars:	Narrow, continuous, yellow, sometimes divided and indistinct; hairless to finely hairy.
Auricles:	**To 4 mm. long**, clawlike, clasping.
Heads:	Spikes stiff, erect, dense, thick, **1-2.5 dm. long**; spikelets **often 3-5 per node**; glumes very narrow, awn-tipped, 10-20 mm. long; lemmas **10-15 mm. long, hairless to finely hairy**, usually short-awn pointed.
Habitat & Distribution:	Common in the southern prairies and foothills. Found in moister sites: along river banks, in shrubby coulees, on moist snow melt slopes, in areas with springs and seepages. An indicator of increased soil moisture.
Forage Value:	Fair, protein content somewhat lower and that of fiber and ash somewhat higher than more desirable range grasses; as plants do not cure on the stem, quality as winter pasture is poor; giant wild rye is

palatable when young, but quickly becomes coarse and unattractive until winter when the foliage sometimes softens and becomes more readily eaten; seed heads, however, are relished by both game and livestock; giant wild rye is a very productive species, making fair quality hay if cut early and grown with legumes, also shows potential as a silage crop; *E. piperi* is one of our more valuable grass species in providing cover and habitat for wildlife.

Grazing Response: A decreaser, prone to heavy utilization in areas where more attractive forage is scarce; palatability of seed heads also reduces the ability of plants to produce sufficient seed to ensure survival.

Notes: Syn. *E. cinereus*, *E. condensatus*; giant wild rye was used to some extent by native people, the seed valued as a source of food; as well, the Blackfoot Indians sometimes fashioned temporary shelters in stands of giant wild rye when on war parties; *E. piperi* has received recognition on the commerical market, both because the extensive root system has excellent soil binding properties, and as it provides habitat for wildlife; plants are slow to establish from seed (about 3 years required to reach maximum height) but show good germination and seed is relatively easy to handle without specialized machinery.

FESTUCA L. - Fescue

Common Characteristics

- Perennials, often tufted.
- Sheaths open.
- Leaves averaging narrower than *Bromus* ssp.
- Panicles erect-spreading; with several-flowered spikelets.
- Glumes narrow, shorter than lemmas, not compressed-keeled.
- Lemmas 5 mm. long or more, with 5 obscure nerves, awnless or awned from top.
- Palea as long as lemma.

Key to Festuca

1. Introduced plants with auricles. 2

Plants without auricles 3

2. Rhizomes elongate; plants 5-10 dm. tall; leaves to 8 mm. wide, glossy, bright green, soft, lax, smooth; auricles glabrous. *F. pratensis*

Tall, coarse plants about 1 m. tall or more; leaves firm, scabrous below, to 10 mm. wide; auricles ciliate. *F. elatior* var. *arundinaceae*

3. Lower sheaths reddish-brown, becoming shredded, new shoots often reclining; blades mostly smooth. *F. rubra*

Lower sheaths not shredded, new shoots usually ascending; blades rough 4

4. Stout plants; glumes nearly as long as spikelets; lemmas 6-10 mm. long 5

Plants more slender; glumes distinctly shorter than spikelets; lemmas 7 mm. long or less 7

5. Plants to 6 dm. tall, in bunches connected by short rhizomes; blades to 1.5 mm. wide, always inrolled; lemmas 7-8 mm. long; glumes nearly equal, 6-7 and 7-8 mm. long; spikelets 2-3 flowered. *F. hallii*

Plants 6-10 dm. tall; rhizomes absent 6

6. Plants 3-8 dm. tall; foliage yellow-green to dark green; leaves 1-2.5 mm. wide, often flat; lemmas 6-8 mm. long. *F. altaica*

Plants to 10 dm. tall; tussocks large; blades 2-4 mm. wide, flat to inrolled, blue-green; lemmas 7-9 mm. long; glumes distinctly unequal, 3-6 and 4-8 mm. long; spikelets 3-6 flowered. *F. campestris*

7. Culms mostly over 3 dm. tall, panicles 1-2 dm. long, somewhat open; blades 5-25 cm. long; anthers 2-4 mm. long. *F. idahoensis*

Culms usually less than 3 dm. tall, panicles to 1 dm. long, narrow; blades 5-15 cm. long; anthers less than 2 mm. long. *F. saxímontana*

Festuca campestris Rydb. - Foothills Rough Fescue

Growth Habit: **Densely tufted**, often forming large tussocks, with fibrous roots; culms **3-10 dm. tall**, hairless, usually lustrous.

Blades: **2-4 mm. wide, 7-nerved**, to 50 cm. long, long-pointed; **flat to inrolled, roughened** above and below and on margins; **breaking off at collar**; folded at emergence; foliage **grey to blue-green.**

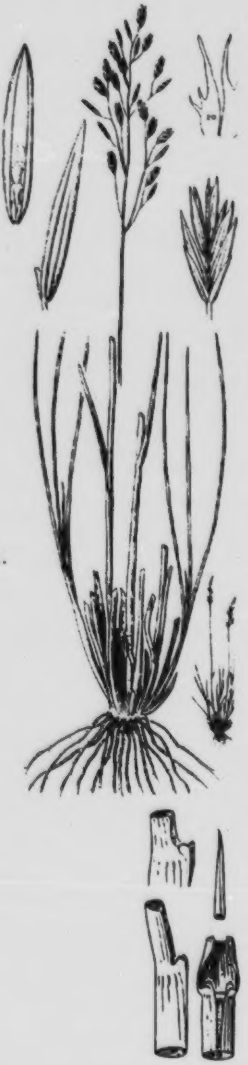
Sheaths: Round to slightly compressed, **split, shiny**, hairless to somewhat roughened, **purplish at base, old sheaths persistent**; margins pale, overlapping.

Ligules: To 0.5 mm. long, membranous, truncate, **notched,** lacerate, hair-fringed.

Collars: Very narrow, distinct, hairless, yellowish.

Auricles: Absent.

Heads: Panicles 10-20 cm. long, open to contracted, but lower branches sometimes spreading; lowest nodes with 1-3 branches; spikelets **3-6 flowered; glumes unequal**, shorter than first lemma, **3-6** and **4-8 mm. long**, lustrous; lemmas **7-9 mm. long**, roughened, occasionally tinged with purple, **awnless, 5-nerved**.



Related Species:

1. ***Festuca altaica*** Trin. *ex* Ledeb - Northern Rough Fescue

Most common in the northern Rocky Mountain region where it is often abundant, found from low to high elevations. Grows in open woods, in grassy meadows, on slopes and gravelly ridges.

Differs as follows:

- Plants often smaller, culms averaging 3-8 dm. tall.
- Blades often narrower, 1-3 mm. wide, but usually flat and more lax in life.
- Foliage yellow-green to dark green.
- Shoots smaller, less coarse.
- Sheaths sometimes pink at base, but not consistently so.
- Spikelets and lemmas slightly smaller (spikelets 10-13 mm. long, lemmas 6-8 mm. long).
- Lemma nerves more distinct; glume margins consistently hyaline.

Habitat & Distribution:

Found on montane slopes, and is a dominant climax species in foothills grassland. Rough fescue is part of earlier phase succession in subxeric foothills/montane ecosites. Where moisture limitations are most significant, tree succession is relatively slow and the fescue grasslands often persist and can be considered relatively stable late phase communities. It is suspected that the species may be found eastward, but its range is usually limited to the Black Soil Zone.

Intermediates between this species and *F. hallii* may occur in the eastern fringes of its range and in Cypress Hills.

Forage Value:

Good; early spring protein and digestible carbohydrate content is high, and that of fiber and lignin relatively low; as well, plants cure on the stem, providing good quality forage throughout fall and winter; palatability ratings are usually high, although sheep sometimes find foliage coarse, and accumulated, ungrazed litter can make animals seek other more lush growth (in these cases mowing, burning or short term, high intensity grazing can be beneficial); *F. campestris* produces fairly good yields as native hay, with a dry matter digestibility of over 55% when cut in July.

Grazing Response:

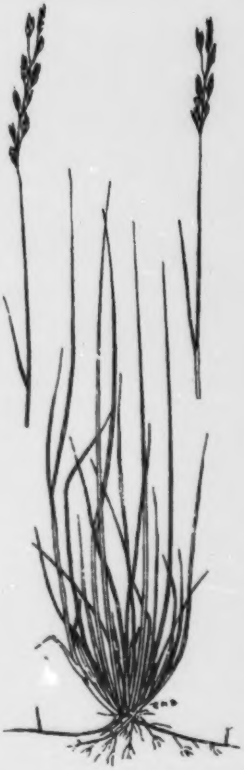
A decreaser; unless management practices allow for periodic seed set, rough fescue will decline in both vigor and prominence and will ultimately be replaced by increaser forbs and grasses, and woody species such as shrubby cinquefoil.

Notes:

F. campestris is probably the most valued climax species in the foothills region, and as such is recommended for revegetating disturbances as well as restoring altered rangelands; as with other climax species, however, it should be seeded in a mix that includes early successional grasses that will provide the necessary cover while the slower growing rough fescue seedlings establish; *F. campestris* is reputed to have poor germination, although use of locally collected seed as well as shallow seeding have greatly improved germination rates; both high demand and shortage of seed (plants normally produce heads, at the most, every second year) means that seed will remain expensive even with the recent increases in development of the species.

Festuca hallii (Vasey) Piper - Plains Rough Fescue

Growth Habit: Densely tufted perennial, also forming short rhizomes; tufts usually smaller than in *F. campestris*, and are **joined by rhizomes;** culms lustrous, **2-6 dm. high.**



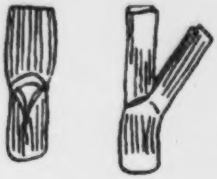
Blades: **1-1.5 mm. wide**, to 30 cm. long, **5-nerved**, long-pointed, **always inrolled;** roughened above and below and on margins; hairless to finely hairy; breaking off at collar; folded at emergence; blades blue/grey-green.

Sheaths: Round, ridged, hairless, shiny, sometimes suffused with purple, and **purple at base, old sheaths persistent**; split, margins pale, overlapping.

Ligules: Lacerate, hair-fringed, **not prominently notched**.

Collars: Indistinct, yellowish.

Auricles: Absent.

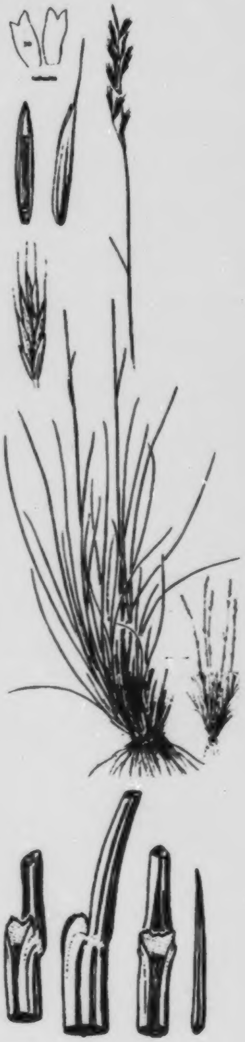


Heads: Panicles 6-15 cm. long, open to contracted, lowest 1-2 per node and sometimes spreading; spikelets **2-3 flowered**, the third floret sterile; glumes **nearly equal, 6-7 and 7-8 mm. long,** as long as first lemma, lustrous, hairless, often suffused with purple; **lemmas 7-8 mm. long,** roughened or with minute hairs, often purplish, **awnless**; lemma nerves often obscure.

Habitat & Distribution: Found throughout the parkland area, eastern Cypress Hills, and in better soils in drier portions of the prairies where it occurs on moist slopes, snow melt and other sheltered areas.

Forage Value:	Good, although some reports indicate spring protein content to be somewhat lower than that of other climax species; *F. hallii* makes good winter pasture provided plants can completely cure before frost, and is palatable throughout the season except when litter accumulates and in hot, dry weather when livestock will seek more lush vegetation in depressional areas; plains rough fescue makes good native hay, producing high yields, the short-rhizomatous, less densely tufted growth habit making it less difficult to cut than *F. campestris*.
Grazing Response:	A decreaser, in many places now replaced by such species as western porcupine grass, awned wheat grass and forbs; although rhizomatous, vegetative reproduction is slow, plants still primarily depending upon seed for stand maintenance; also contributing to its demise is the cultivation of vast acreages that were at one time pristine *F. hallii* rangelands.
Notes:	Syn. *F. scabrella* (lumped by some authors with *F. campestris*); like foothills rough fescue, *F. hallii* is a valuable climax species, but seed is expensive and in short supply, and plants are slow to establish; the species can be propagated by sprigs, but probably only with limited success due to the rather slow growing nature of the rhizomes.

Festuca idahoensis Elmer - Bluebunch Fescue

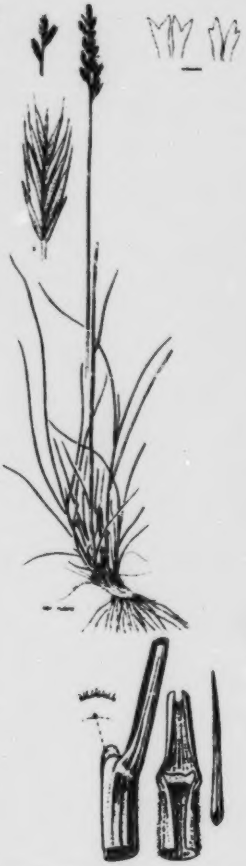


Growth Habit:	**Densely tufted** perennial, forming large bunches; roots fibrous; culms 3-10 dm. tall.
Blades:	**To 2 mm. wide, 5-25 cm. long, elongate, mostly blue-green, hair-like**, veins indistinct; blades hairless, roughened; folded at emergence.
Sheaths:	Flattened and keeled, split part way, smooth to roughened, **basal sheaths pinkish**.
Ligules:	To 1 mm. long, truncate, hair-fringed, notched.
Collars:	Indistinct.
Auricles:	Absent to rudimentary.
Heads:	Panicles **1-2 dm. long**, narrow to somewhat open; spikelets 5-7 flowered, often purple tinged; glumes narrow, about 3.5 and 5 mm. long; lemmas rounded with age, roughened to hairless, **about 7 mm. long, with awns 2-4 mm**. long; anthers **2-4 mm. long**.
Habitat & Distribution:	Common in southern foothills and montane grassland, on the Milk River Ridge. Grows on rocky slopes, in open woods, in foothills and montane grasslands where associated with rough fescue.
Forage Value:	Good, protein and phosphorus contents high in the spring and gradually declining by fall; plants cure on the stem, thus providing fairly good winter grazing; palatability is generally good throughout the season, although foliage sometimes becomes somewhat harsh by fall.

Grazing Response: An increaser #I in most areas, plants capable of withstanding relatively heavy grazing and trampling, and increasing when less persistent grasses are grazed out; bluebunch fescue is considered a decreaser in some areas (i.e. on gravelly soils and thin breaks); its high prominence on rangelands such as those on the Milk River Ridge indicates a naturally high occurrence of the species rather than an overgrazed condition.

Notes: Also known as Idaho fescue, common and widely distributed in the far Western States; "bluebunch", a reference to the characteristic blue-green foliage; F. *idahoensis* is a preferred native alternative throughout its range; unfortunately, although it produces greater quantities of fairly viable seed as compared to rough fescue, seed is still in short supply, thus is expensive and difficult to locate.

Festuca rubra L. var. *rubra* - Red Fescue



Growth Habit: Tufted perennials with **short rhizomes**; culms erect, **often reclining at base**, 1-8 dm. tall; **new shoots spreading**.

Blades: **To 3 mm. wide**, 5-15 cm. long, V-shaped to folded, dark green; veins prominent above, and sometimes with fine hairs and slightly roughened; **lower surface smooth** and shiny; margins smooth to minutely roughened; folded at emergence.

Sheaths: Round to oval, usually finely hairy, split part way, **dead basal sheaths reddish-brown, conspicuously shredded** from disintegration of thin membrane between persistent veins.

Ligules: To 0.5 mm. long, membranous, truncate, entire to hair-fringed.

Collars: Indistinct, narrow, continuous, hairless, pale green.

Auricles: **Absent**, or merely rounded extensions of collar ends.

Heads: Panicles 3-20 cm. long, branches erect to ascending; spikelets pale green to glaucous, often purplish; glumes lanceolate, about 3 and 5 mm. long; lemmas **about 7 mm. long**, with narrow pale margins, **short awn-tipped**; anthers 2-4 mm. long, hairless.

Related Species:

1. ***Festuca rubra*** L. var. ***arenaria*** (Osbeck) Fries
    - Lemmas densely hairy.
    - Lower leaf surface sometimes minutely hairy.
2. ***Festuca rubra*** L. var. ***commutata*** Gaud. - Chewings Fescue

    Resembles var. *rubra* but:
    - Plants tufted, usually not rhizomatous.
    - Plants often shorter, blades finer and brighter green.

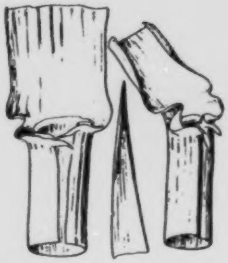
Similar Species:

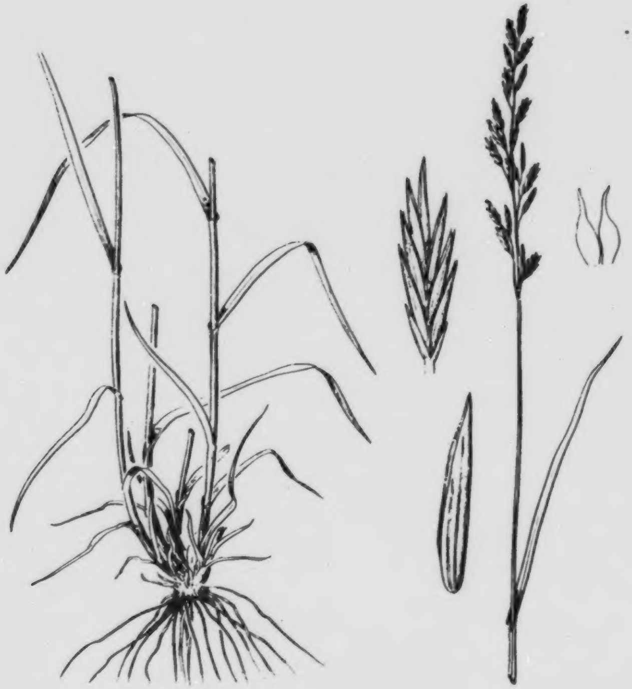
1. ***Festuca pratensis*** Huds. - Meadow Fescue

   Also introduced, grown in moister regions and under irrigation in the prairies.

   Distinguished as follows:

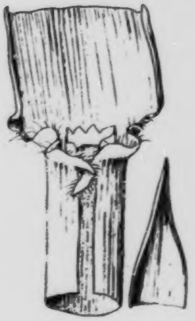
   - Base of plants red-purple.
   - Blades flat, glossy, to 8 mm. wide, smooth below, somewhat rough above.
   - Auricles present.
   - Lemmas mostly awnless, with pale tips.

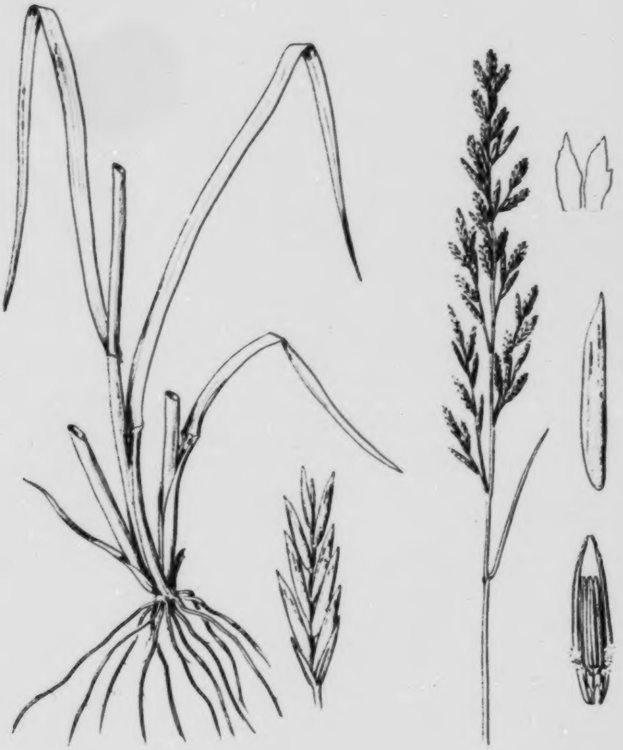




2. ***Festuca elatior*** L. var. ***arundinacea*** (Shreb.) Wimm. - Tall Fescue
Also introduced, seeded in somewhat wetter places.
Differs from *F. pratensis*:

- Rhizomes absent or short.
- Plants coarser and taller, to 1 m. tall.
- Auricles ciliate.
- Leaves rougher.
- Short awns present on lemmas.





Habitat & Distribution: Native components apparently occur in western and northern regions where it is found in foothills grassland, in moist meadows, along streams.

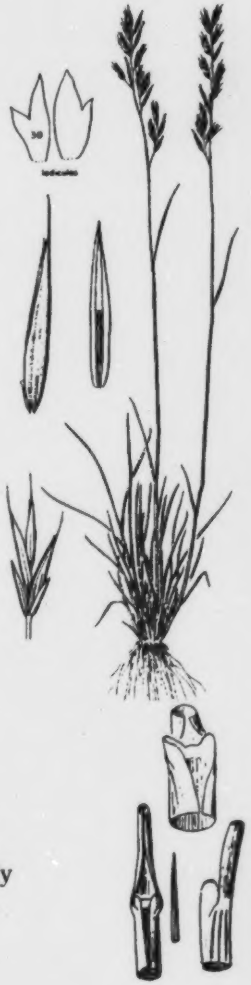
Introduced varieties grown extensively in all but the driest regions.

Forage Value: Good, with nutritional elements in good balance, and protein content high and remaining good until fall; *F. rubra* is very palatable to both livestock and game throughout the growing season and also during winter months, as plants tend to stay green and succulent; foliage is too fine and short to be hayed easily, but the species nevertheless produces fairly good yields, and is widely used for pasture in areas with good annual moisture and under irrigation in the drier prairie region. *Note: F. pratensis* is considerably less palatable, tall fescue rated as moderately palatable, thus more often recommended in pasture mixes.

Grazing Response: An increaser (native strains) and invader (introduced elements).

Notes: *Rubra*, a reference to the reddish-tinged panicle and plant bases; red fescue is widely used in reclamation, valued as a soil stabilizer because of its sod-forming properties; a number of cultivars are well adapted to the entire region (including the extreme north and alpine habitats), seed is readily available and prices not prohibitive; however, although *F. rubra* is not intrusive in rangeland, indigenous species should be substituted whenever possible to maintain a native vegetation composition.

Festuca saximontana Rydb. - Sheep Fescue

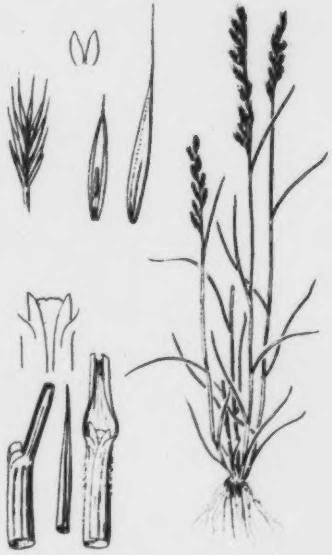


Growth Habit:	**Densely tufted** perennial with fibrous roots; culms hairless, **1-5 dm. tall**.
Blades:	**To 1 mm. wide, 5-15 cm. long, mostly in basal tufts**, not elongate; very slender, folded to inrolled, hairless, **green** (rarely somewhat blue-green but not blue as in *F. idahoensis*); **roughened** above and usually below; margins roughened; folded at emergence; veins distinct.
Sheaths:	Round to slightly compressed, split, mostly hairless and smooth, light green; margins overlapping, broad, pale; **basal sheaths yellowish to light brown**, persistent.
Ligules:	Membranous, truncate, very short, to 0.5 mm. long, hair-fringed.
Collars:	Indistinct, narrow, hairless, yellowish.
Auricles:	Absent.
Heads:	Panicles **2-10 cm. long**, linear-lanceolate, interrupted, branches erect, yellowish-green; glumes lanceolate, 2-3 mm. long; lemmas **2-4 mm. long**, lightly roughened on back, with awns 1-3 mm. long; lemmas somewhat rounded with age; **anthers 1-1.5 mm. long**.
Related Species:	1. ***Festuca ovina*** L. - Sheep Fescue Introduced, occasional. Differs as follows: • Panicle branches stiff but loosely open and spreading at maturity. • Anthers longer, 2.5-3 mm. long. • Lemmas somewhat larger, 4-5.5 mm. long, awns to 1 mm.

2. ***Festuca ovina*** var. ***duriuscula*** (L.) Koch. - Hard Fescue
   Introduced.
   Similar to *Festuca ovina* except:
   - Leaves often smooth, wider, firmer, usually more elongate.
   - Basal sheaths often pink.

Similar Species:

1. ***Vulpia octoflora*** (Walt.) Rydb. - Six Weeks Fescue Syn. *Festuca octoflora* Walt.
   Grows in the prairies, restricted to southern regions. Found on exposed, dry, often sandy soil, in overgrazed and disturbed areas.
   Distinguished as follows:
   - Plants annual, purple-tinged below.
   - Blades very narrow, to 10 cm. long, twisted, dark green.
   - Panicles slender, erect.
   - Lemmas inrolled, with awns 3-5 mm. long.



Habitat & Distribution:

Native, found in all Ecoregions.
Found in open woods, on dry montane slopes, in grassland. Absent from poorer soils of the prairie region.

Forage Value:

Good, with nutritional elements remaining at acceptable levels until fall; *F. saximontana* is palatable to livestock and game, often staying green and succulent from emergence until late fall; the species, however, receives a rather low rating as a rangeland grass due to its low growth habit and poor yields; as such, it is unsuitable for hay production.

Grazing Response:

An increaser, but is seldom very abundant, and not considered aggressive or troublesome in rangeland.

Notes:

Syn. *F. ovina* ssp. *saximontanta*, *F. brachyphylla* ssp. *saximontana*; the name "sheep fescue" translates literally from the scientific name, referring to the species' high palatability to sheep; *F. saximontana* is recommended in reclamation work, although native elements are only sporadically seeded, as seed is in short supply; various cultivars, however, are widely used, these also well adapted to rather poor, gravelly, infertile, moderately acidic soils, and are useful when climax native species would not survive; introduced components show improved forage yields as well as better germination, but because some cultivars have coarser foliage, they become less palatable as the season advances.

GLYCERIA R. Br. - Manna Grass

Common Characteristics

- Tall wetland grasses.
- Sheaths mostly closed to near top.
- Panicles open to contracted.
- Spikelets small, several flowered, glumes shorter than lemmas.
- Lemmas less than 8 mm. long, with nerves parallel, prominent.

Key to Glyceria

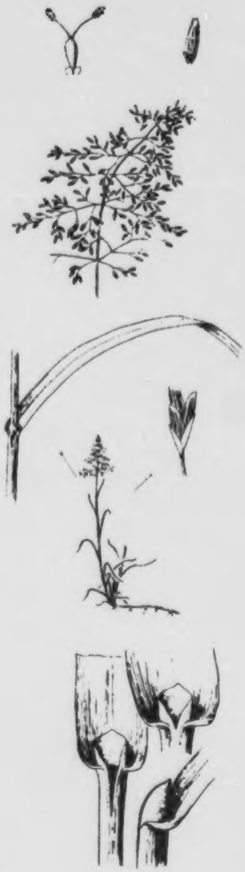
1. Blades paler above; ligules 5-10 mm. long; panicles very narrow, erect; spikelets linear, 7-14 mm. long. *G. borealis*

Blades not distinctly paler above; panicles broader and open; spikelets ovate-oblong, not more than 7 mm. long 2

2. Plants 3-8 dm. tall; blades 2-4 mm. wide; panicles 1-2 dm. long; first glume less than 1 mm. long; lemmas barely 2 mm. long. *G. striata*

Plants 10-15 dm. tall; blades to 15 mm. wide; panicles 2-4 dm. long; first glume about 1.5 mm. long; lemmas 2.5-2.7 mm. long. *G. grandis*

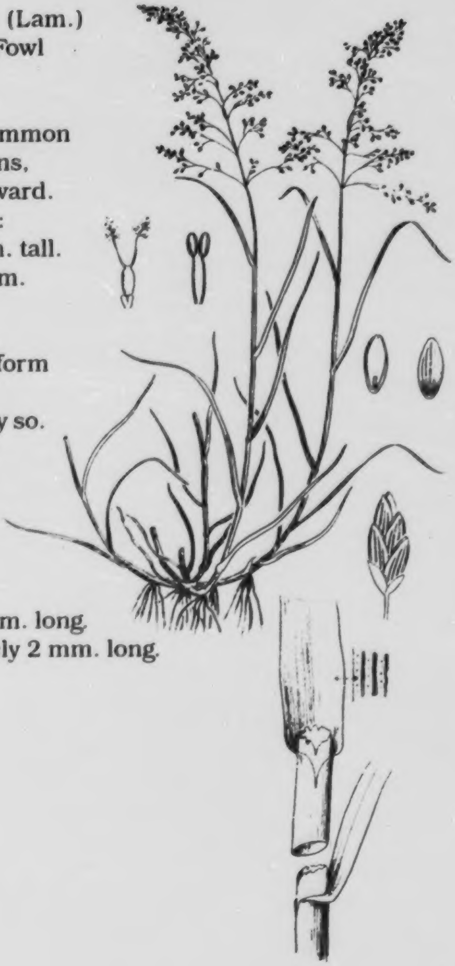
Glyceria grandis S. Wats. *ex* A. Gray - Tall Manna Grass



Growth Habit:	**Strongly rhizomatous** perennial; culms smooth, thick, somewhat tufted, from **10-15 dm. tall**.
Blades:	**To 15 mm. wide**, 10-40 cm. long, flat to V-shaped, firm, tapering to a **boat-shaped tip**; hairless, slightly finely roughened on margins and above, smooth below; veins below fine but prominent, with midvein white; **conspicuously muriform**; folded at emergence.
Sheaths:	Compressed, keeled, closed to near top but easily ruptured, smooth to slightly roughened, pale or yellow-green; **strongly veined and muriform**; basal sheaths often **spongy and tinged with purple**.
Ligules:	To 4 mm. long, membranous, truncate to abruptly long-pointed, **hairless**, entire to wavy, split with age.
Collars:	Conspicuous, divided, narrow, pale green to yellowish-brown.
Auricles:	Absent.
Heads:	Panicles large, **open**, nodding, **2-4 dm. long**, with numerous spreading branches; glumes **1.5 (first) and 2 mm. (second) long**, pale, the tips pointed and usually minutely hair-fringed and/or jagged; lemmas purplish, 7-nerved, **2.5-2.7 mm. long**, the top firm and blunt.

Similar Species:

1. ***Glyceria striata*** (Lam.) A.S. Hitchc. - Fowl Manna Grass
   Found in similar habitats, most common in southern regions, occasional northward. Differs as follows:
   - Plants 3-8 dm. tall.
   - Blades 2-4 mm. wide.
   - Blades and sheaths muriform but less conspicuously so.
   - Ligules finely hairy on the back.
   - Panicles 1-2 dm. long.
   - First glume less than 1 mm. long.
   - Lemmas barely 2 mm. long.

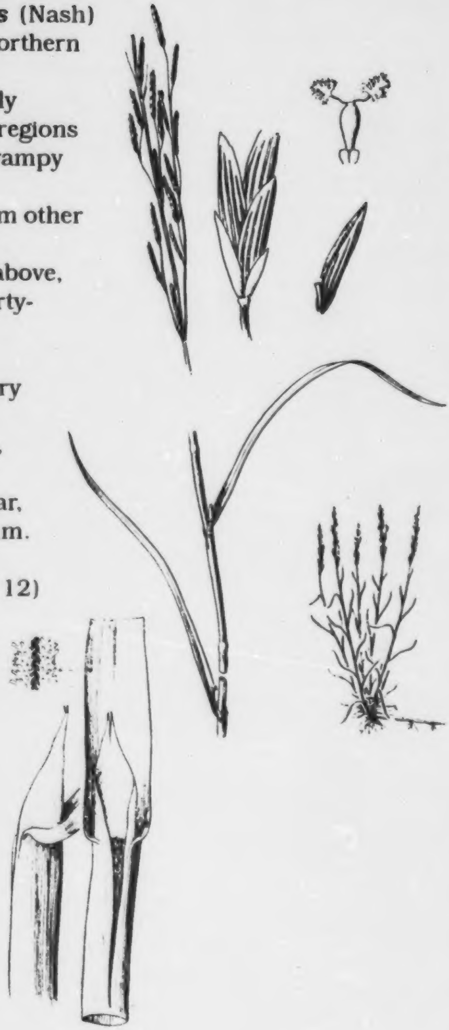


2. ***Glyceria borealis*** (Nash) Batchelder - Northern Manna Grass

Found sporadically throughout most regions in moist, often swampy places.

Distinguished from other *Glyceria* species:

- Blades paler above, also finely warty-roughened.
- Ligules 5-10 mm. long, hairy across back.
- Panicles erect, narrow.
- Spikelets linear, terete, 7-14 mm. long with numerous (to 12) flowers.



Habitat & Distribution: Common, grows in all Ecoregions.
Found along streams, on shores, in wet meadows, sometimes in shallow water.

Forage Value: Good, spring protein content rating at about 22% until mid-June, dropping rapidly to 7% by August; fiber content is low, that of phosphorus high throughout the season; plants are palatable (including seed heads) and are often consumed more readily in late summer and fall if upland grasses become dry and brittle; as with other wetland grasses, *G. grandis* makes fair quality but rather light hay.

Grazing Response: A decreaser, able to withstand moderate trampling due to rhizome growth, but stands tend to decline with continued heavy use which usually also depletes the seed supply needed to ensure survival.

Notes: From the Greek *glukeros*, meaning sweet, a reference to the fruits, the seeds of several European species traditionally used in soups or ground into meal; *grandis* alluding to the large size of plants, the term "manna" a reference to the edible properties of the seeds; tall manna grass shows potential for use in stabilizing wetlands provided soils are not saline or alkaline; seed crops can be grown on upland sites in better soil and moisture zones; the seed, although small, is manageable with conventional machinery, but care must be taken during harvest as heads shatter readily once mature.

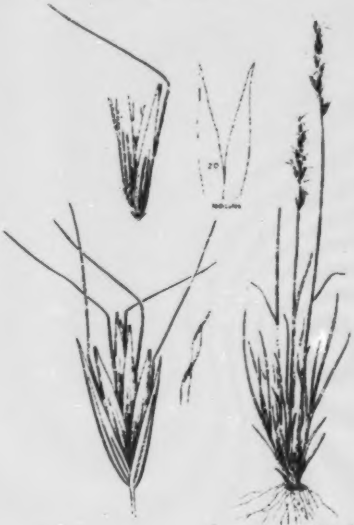
HELICTOTRICHON Besser - Oat Grass

Common Characteristics

- Tufted perennials.
- Leaves with boat shaped-tips.
- Ligules membranous.
- Spikelets 1-1.5 cm. long, 3-6 flowered.
- Glumes nearly as long as spikelets.
- Lemmas bearded at base, with a twisted awn.

Helictotrichon hookeri (Scribn.) Henr. - Hooker's Oat Grass

Growth Habit: Erect, **densely tufted** perennial with a relatively shallow fibrous root system; culms smooth, 2-4 dm. tall.

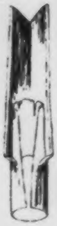


Blades: To 5 mm. wide, 2-12 cm. long, **flat to folded, very erect**, linear, **boat-shaped at tip**; hairless, **pale green to blue-green, succulent, midribs and margins with thickened white nerve**, margins roughened; folded at emergence.

Sheaths: **Compressed, keeled**, especially basal ones, split, prominently veined, hairless, pale green at base; margins pale.

Ligules: **To 5 mm. long, membranous**, blunt to pointed.

Collars: Divided, inconspicuous, yellowish to light brown/ purplish.



Heads: Panicles erect, each branch bearing 1 (rarely 2) spikelets; spikelets **3-6 flowered, brownish, shiny**; glumes **12-14 mm. long**, thin-transparent; lemmas 10-12 mm. long, roughened, with **callus bearded**; awns 1-1.5 cm. long, flattened, **twisted and abruptly bent**, arising from below middle and exserted from between **narrow teeth at top of lemma**.

Habitat & Distribution:	Common in foothills, montane and parkland regions, restricted to better soils in the prairies, and occasional northward. Found in open grassland.
Forage Value:	Fair, mineral content similar to that of other rangeland grasses, protein content high in the spring, dropping to about 10% by mid-July, and is relatively low by winter as plants do not cure on the stem; Hooker's oat grass is palatable throughout the season, but as it seldom occurs in dense stands, it generally provides little forage.
Grazing Response:	A decreaser, plants readily consumed and not always able to produce enough seed to maintain the population.
Notes:	Syn. *Avena hookeri*; from the Greek *helicos*, twisted and *trichon*, hair, referring to the twisted awns; as with all minor components of native grasslands, the species is valued in native seed mixes in order to maintain species diversity; *H. hookeri* grows readily from seed, but awns make it somewhat difficult to handle without specialized machinery.

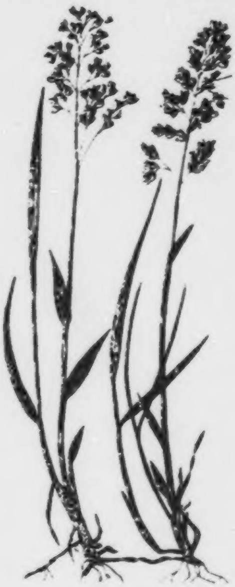
HIEROCHLOE R. Br. - Sweet Grass

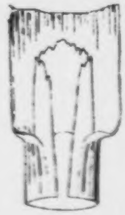
Common Characteristics

- Perennials with sweet, alfalfa-like odor.
- Spikelets brownish, 3-flowered, the terminal fertile, the lower staminate or neutral.
- Glumes thin, shiny, 3-nerved.
- The staminate lemmas hairy, fertile mostly hairless or hairy at top.

Hierochloe odorata (L.) Beauv. - Sweet Grass

Growth Habit:	Sod-forming perennial with **extensive rhizomes**; culms 3-6 dm. tall.
Blades:	To 8 mm. wide, 2-20 cm. long, flat to rolled, tapering to an blunt point, dark green; slightly roughened to smooth and shiny below, smooth to slightly roughened above; veins on both sides prominent, and white midvein below; margins roughened; rolled at emergence; **blades of 2 types: those of fertile stems few**, and only **to 3 cm. long, with boat-shaped tips; those of sterile shoots long, curved, pointed**.
Sheaths:	Round, split, prominently veined, smooth to slightly roughened, **often purplish at base**, especially those of young shoots; margins pale.
Ligules:	To 3 mm. long, membranous, blunt, toothed, lacerate, often jagged-hair-fringed.
Collars:	Narrow, divided, light green, **hairless to finely hairy on fertile shoots**, usually **short-hairy on leafy shoots**.
Auricles:	Absent.
Heads:	Panicles 4-10 cm. long, **pyramidal**, open and spreading to compact; **spikelets bronze to purplish**; glumes **broad**, 4-6 mm. long, **thin, shiny; staminate lemmas hair-fringed and short-hairy across back, awnless; fertile lemmas usually short-hairy at top**.





Habitat & Distribution: Common throughout most regions.
Grows in fescue grassland, montane grassland, and in moister areas in the prairies - often in wet meadows, around sloughs.

Forage Value: Good, protein content high in the spring, remaining as high as 9.5% by early August; other nutrients are in good balance, with total digestible nutrients as high as 70%; sweet grass is fairly palatable, although overall ratings are somewhat lower than those of many range grasses.

Grazing Response: An increaser #I, the vigorous rhizome growth ensuring stand maintenance under normal grazing conditions, but the species not persisting in abused and altered range.

Notes: From the Greek *hieros*, sacred, and *chloe*, grass; also known as holy grass; sweet grass was one of several species traditionally strewn in front of European churches on saints days, and also received wide recognition by N. American Indians in religious ceremonies, mixed with tobacco for smoking, braided and worn in various ways, and used as a perfume and solution as a hair wash; smoke from burning leaves was inhaled to relieve cold symptoms, and the leaves given to horses as they supposedly made them long-winded.

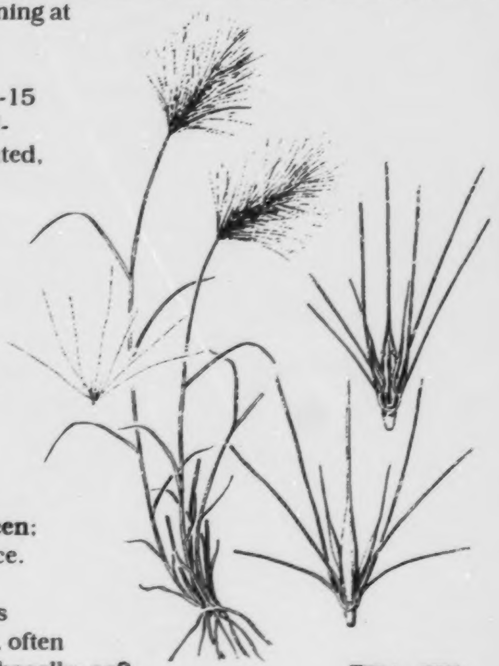
HORDEUM L. - Barley

Common Characteristics

- Perennials or annuals with dense bristly spikes.
- Spikelets 1-flowered, stalkless or nearly so.
- Spikelets 3 per node, the middle one stalkless, the lateral two very short stalked or stalkless and reduced to awns.
- Glumes very narrow, glumes and lemmas usually long awned.

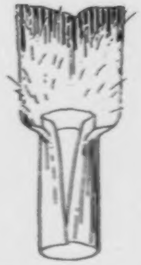
Hordeum jubatum L. ssp. *jubatum* - Foxtail Barley; Wild Barley
Syn. *Critesion jubatum*

Growth Habit: **Densely tufted** perennials with fibrous roots; culms 3-8 dm. tall, erect or reclining at base.



Blades: To 6 mm. wide, 5-15 cm. long, flat to U-shaped, long-pointed, twisted, veins prominent; **soft**, with **upper surface roughened and hairy, lower surface softly hairy**, sometimes minutely roughened; margins roughened; **light green to blue-green**; rolled at emergence.

Sheaths: Round, split, veins distinct, glaucous, often purplish, at least basally; **soft-hairy**; margins overlapping, pale.



Ligules: To 1 mm. long, membranous, blunt to truncate, lacerate, finely hair-fringed.

Collars: Medium broad, divided by midvein, hairless, pale green to yellowish, often oblique.

Auricles: **Absent to rudimentary extensions of collar margins.**

Heads:

Spikes 5-10 cm. long and nearly as broad, axis disarticulating at maturity; **lateral spikelets short-stalked, usually reduced to awns**; central fertile one stalkless, lemma 5-7 mm. long; **awns and glumes soft**, 3.5-9 cm. long, **spreading at maturity**, roughened.

Related Species:

1. ***Hordeum jubatum*** L. ssp. ***breviaristatum*** Bowden
   - Glumes and lemma awns less than 2 cm. long.
2. ***Hordeum jubatum*** L. ssp. X ***intermedium*** Bowden
   - A hybrid of the two given ssp.: glumes and lemma awns 1-3.6 cm. long.

Habitat & Distribution:

Very common throughout. Ssp. *breviaristatum*, ssp. *jubatum* and ssp. X *intermedium* found sporadically throughout.
A weedy native, common in waste places, on roadsides, in fields. In the prairie region it is restricted to moister situations: around sloughs, in depressions, along streams, also an invader in overgrazed irrigated pastures.
Tolerant of moderate alkalinity, and occurs in low alkaline areas.

Forage Value:

Poor, although actual nutritional analysis shows low crude fiber ratings, and high protein and phosphorus contents in early spring, these dropping off steadily as the season advances; foxtail barley is palatable before seed heads emerge, and can provide some early grazing in low areas before upland grasses green-up; seed heads, however, are not readily eaten, and are potentially dangerous as awns can invade soft tissues, causing irritation and infection; *H. jubatum* produces fair quality (although poor yielding) hay, but again awns can be troublesome.

Grazing Response:

An increaser, producing an abundance of viable seed which is readily spread by wind or attaches to machinery, clothing and animal hair; foxtail barley is invasive in overgrazed range, as seed heads are generally not grazed, allowing the species a competitive advantage over more palatable grasses.

Notes:

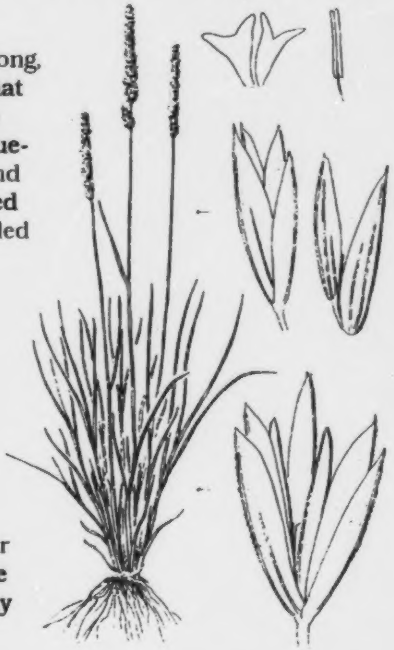
The generic name *Hordeum* is the classical Latin name for barley; although often a natural invader on poor and disturbed soils, foxtail barley is regarded as weedy and is difficult to eradicate once established; aggressive, early successional but better quality species should be seeded in depressional and irrigated areas, and, if possible, should be left ungrazed or grazed lightly until revegetation is complete.

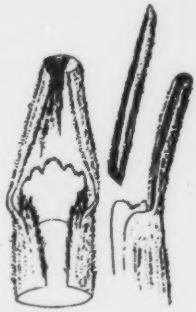
KOELERIA Pers. - June Grass

Common Characteristics

- Tufted perennials.
- Leaves short, mostly basal.
- Panicles contracted.
- Spikelets mostly 2-flowered, 4-5 mm. long.
- Glumes nearly the length of lemmas, awnless.
- Lemmas with short awn borne just below tip.

Koeleria macrantha (Ledeb.) J.A. Schultes - June Grass





Growth Habit:	Perennials, **forming small dense tufts**; culms softly hairy to hairless, 2-5 dm. tall.
Blades:	To 4 mm. wide, 5-12 cm. long, **mostly basal, tip somewhat boat-shaped**, blunt; flat to inrolled, **light green to blue-green,** stiff but also **soft** and somewhat succulent; **ridged** and roughened **above**, keeled below, hairless on both surfaces to softly hairy with shiny, small hairs; margins roughened and with **narrow white nerve**; folded at emergence.
Sheaths:	Round, split, roughened, often hairy, distinctly veined, margins pale, upper pale green, **basal ones pale cream-colored** and **slightly swollen at crown**.
Ligules:	**To 1 mm. long**, membranous, truncate, blunt, often split, usually hair-fringed.
Collars:	Medium broad, continuous or divided, yellowish-green, smooth to hairy on margins.
Auricles:	Absent.

Heads: Panicles **spike-like**, somewhat open during flowering, becoming contracted, pale green to purplish, 4-10 cm. long; spikelets usually **2-flowered, 4-5 mm. long**; glumes 2-3 and 3-4 mm. long, **nearly as long as first floret**, lightly roughened, at least on keels; lemmas often with **short awn from near tip**, finely roughened to sparsely hairy.

Note: One of our most variable species, showing a variety of growth forms in different environmental conditions. Plants can be short, with smaller basal leaves in dry situations, or more elongate and with numerous, longer leaves. Leaves and sheaths vary from being nearly hairless to conspicuously hairy.

Habitat & Distribution: One of the most common grassland species, found throughout all Ecoregions.

Grows in a wide variety of sites: in montane and foothills grasslands, in prairie and parkland regions, also on suitable sites in the boreal forest. An indicator of subxeric conditions in western regions and thus high cover not exclusively correlated to poor range condition.

Forage Value: Good, protein content at about 20% in early spring, dropping steadily to about 4% by November; phosphorus, crude fiber and digestible carbohydrates rate similar to those of other good upland grasses; June grass is palatable both in early spring and again in late fall and winter; as well, plants cure on the stem and can provide some winter grazing, although the species generally produces relatively little forage.

Grazing Response: An increaser and indicator of overgrazing; although a bunchgrass, June grass produces an abundance of seed, and is usually ungrazed during the summer months, thus allowing for adequate seed production even on heavily utilized pastures.

Notes: Syn. *K. gracilis*, *K. cristata*; named for the German botanist, George Wilhelm Koeler, 1765-1807, author of a book on the grasses of France and Germany; also known as prairie or mountain June grass, koeleria; June grass is currently recommended in most native seed mixes, but seed is in short supply and very expensive, and has a history of poor germination; because of this, it generally should not comprise more than a small percentage of any seed mix (exceptions might be made when low growing species are required).

MUHLENBERGIA Schreb. - Muhly Grass

Common Characteristics

- Mostly rhizomatous, wiry perennials.
- Spikelets 1-flowered, disarticulating above glumes.
- Lemmas less than 4 mm. long, thin, short-pointed to awned-tipped.

Key to Muhlenbergia

1. Panicles open-spreading, with spikelets on long stalks; prairie species. *M. asperifolia*

Panicles narrow, spikelets on short stalks 2

2. Panicles mostly dense, to 1 cm. wide; glumes with long awns much exceeding lemmas; species of bogs/fens. *M. glomerata*

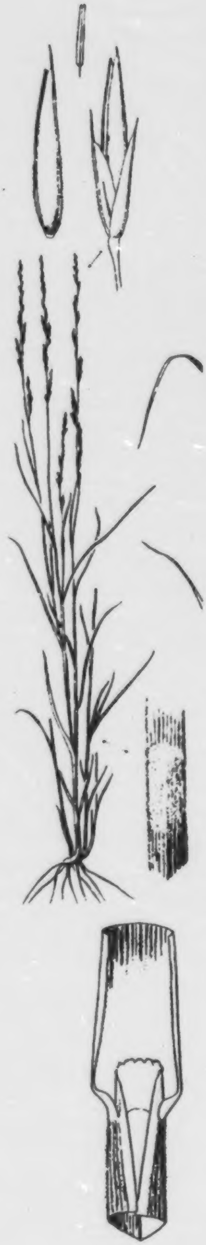
Panicles very fine and slender, branches ascending; glumes with awns equalling or shorter than lemmas; grassland species. 3

3. Plants with extensive rhizomes; ligules conspicuous, 1-3 mm. long; glumes broad (narrowly ovate), 1-1.5 mm. long; species of depressional grassland. *M. richardsonis*

Plants densly tufted, without rhizomes; ligules to 0.5 mm. long; glumes narrow, 2-2.5 mm. long; species of dry sites. *M. cuspidata*

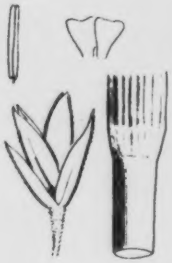
Muhlenbergia cuspidata (Torr.) Rydb. - Plains or Prairie Muhly

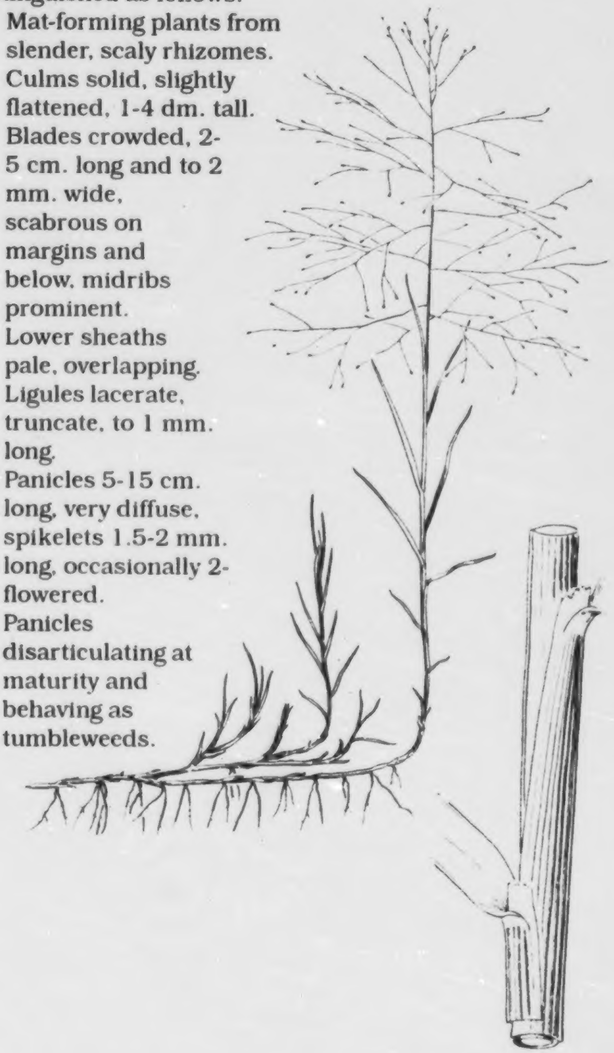
Growth Habit:	**Densely tufted** perennials with fibrous roots, **stooling to form large clumps**; plant **bases bulbous, hardened, scaly**; culms **solid, wiry**, 2-4 dm. tall, most hairs restricted to below nodes.
Blades:	**To 3 mm. wide**, 3-10 cm. long, flat to folded, long-pointed, prominently veined and finely rough hairy above, hairless with prominent midvein below; margins pale, roughened; folded at emergence.
Sheaths:	Slightly flattened, very short, split, hairless or more often finely hairy; margins overlapping.
Ligules:	**To 1 mm. long, inconspicuous**, membranous, truncate to rounded, lacerate, hair-fringed.
Collars:	Broad, somewhat oblique, light yellow, hairless, **often hardened and thickened, giving plants a nodulose appearance**.
Auricles:	Absent.
Heads:	Panicles narrow, 5-10 cm. long, branches ascending; spikelets 1-flowered, about 3 mm. long; glumes narrowed to a short-pointed or short awn-tip, **2-2.5 mm. long**, minutely roughened on keel and margins; lemmas to 2 mm. long, short awn tipped, finely roughened, sometimes finely hairy on basal part of nerves; **lemmas often parasitized by insects, forming small galls.**



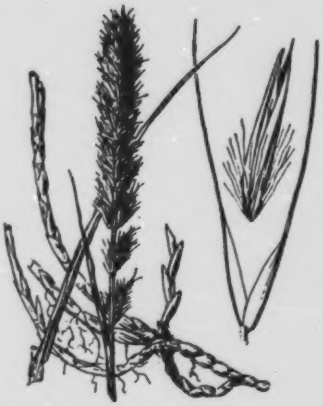
Similar Species:

1. ***Muhlenbergia asperifolia*** (Nees & Mey.) Parodi - Scratch Grass
Occasional in the prairie region on moist alkaline soil, considered a valuable species in providing cover on calcareous and denuded sites that normally support rather sparse vegetation in terms of both species diversity and cover values.
Distinguished as follows:
   - Mat-forming plants from slender, scaly rhizomes.
   - Culms solid, slightly flattened, 1-4 dm. tall.
   - Blades crowded, 2-5 cm. long and to 2 mm. wide, scabrous on margins and below, midribs prominent.
   - Lower sheaths pale, overlapping.
   - Ligules lacerate, truncate, to 1 mm. long.
   - Panicles 5-15 cm. long, very diffuse, spikelets 1.5-2 mm. long, occasionally 2-flowered.
   - Panicles disarticulating at maturity and behaving as tumbleweeds.





2. ***Muhlenbergia glomerata*** (Willd.) Trin. - Bog Muhly
Frequent in the southern boreal forest, also sporadic occurrences in the foothills. A species of wet, peaty places, commonly an indicator of medium rich graminoid-shrubby fens.
Distinguished as follows:



- Plants from hard, scaly rhizomes.
- Culms 3-6 dm. tall, nodes finely hairy, internodes hairy or glabrous-roughened, dull.
- Blades flat, erect, firm, to 5 mm. wide.
- Ligules very small.
- Panicles 4-7 cm. long, dense or somewhat interrupted at base, to 1 cm. broad.
- Spikelets 5-6 mm. long.
- Glumes narrow, with long scabrous awns much exceeding lemmas.
- Lemmas hairy below.

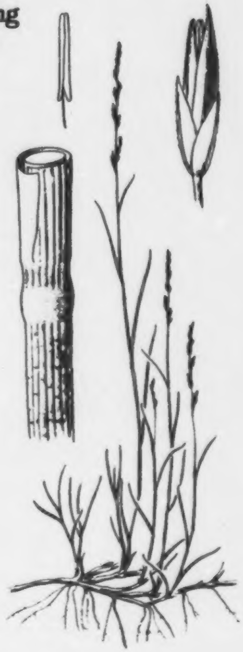
Habitat & Distribution: Scattered, mostly in southern regions.
Occasional on very dry prairie grassland, most common on dry eroded slopes, calcareous clay soils, dry banks. Frequently encountered in badlands.

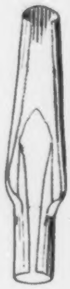
Forage Value: Fair, protein and phosphorus content somewhat lower than that of many upland grass species; plants are moderately palatable in early spring, but unattractive as foliage becomes stiff and wiry; plains muhly cures on the stem, and is sometimes consumed in winter if moisture is sufficient to soften the wiry growth.

Grazing Response: An increaser, often left ungrazed, allowing the plants a competitive advantage when more palatable plants are grazed off; however, the species is not aggressive, as only small amounts of seed are produced, and vegetative reproduction by tillers is slow.

Notes: Named for G.H.E. Muhlenberg (1753-1815), a Pennsylvania Lutheran minister, and student and author of grasses; *cuspidata*, possibly a reference to the short awn (cusp) on glumes and lemmas; plains muhly is of some value in erosion control on steep, erodable slopes where vegetation cover is often sparse; a difficult species to propagate, it may never be commercially available in significant quantities.

Muhlenbergia richardsonis (Trin.) Rydb. - Mat Muhly





Growth Habit:	**Strongly rhizomatous and mat forming plants**; rhizomes long, scaly, thin, hard but **not bulbous**; culms 1-4 dm. high, solid, slightly flattened, **strictly erect, wiry**, mostly glabrous, **roughened-nodulose and kinked at nodes**.
Blades:	**To 2 mm. wide**, 10 cm. long, flat to inrolled, **erect**, finely striate and scabrous and sometimes finely hairy above, mostly smooth and glabrous below; **blue-green**; midribs prominent; margins scabrous; folded at emergence.
Sheaths:	Round, split, smooth, basal ones somewhat loose and swollen; margins hyaline.
Ligules:	**To 3 mm. long, membranous, conspicuous**, blunt to pointed, untoothed to lacerate, **finely hairy below**.
Collars:	To 1 mm. wide, glabrous, continuous, greenish-yellow, margins hardened and thickened.
Auricles:	Absent.
Heads:	Panicles narrow, often spike-like, branches ascending, 5-7 cm. long; **glumes ovate-lanceolate, 1-1.5 mm. long**, pale margined, slightly roughened on nerves and prominent midrib; lemmas about 2.5 mm. long, short-pointed, inrolled, finely roughened.
Habitat & Distribution:	Found throughout most regions, more common in the south. Grows in moist, depressional grassland, around sloughs, often in moderately alkaline situations.
Forage Value:	Fair, similar to that of plains muhly, producing little forage and with nutritional elements somewhat lower than most range

grasses; palatability is low from early spring and throughout the growing season due to tough, wiry stems and leaves; plants cure on the stem, and are sometimes consumed during winter months as they tend to soften with late season moisture.

Grazing Response: An increaser, producing very little seed, but reproducing readily from rhizomes; as well, low growth habit and lack of palatability contribute the species' ability to persist and withstand fairly heavy trampling.

Notes: Some native people recognized the root of a grass (possibly *M. richardsonis*) that inhabited depressional alkali sites as highly palatable to horses, also to be useful as horse medicine; mat muhly is of rather limited importance as a reclamation species, although it sometimes colonizes moderately alkaline disturbances where better quality species cannot establish; in these cases, it is useful in binding soil and providing cover.

ORYZOPSIS Michx. - Rice Grass

Common Characteristics

- Tufted perennials.
- Spikelets 1-flowered, disarticulating above glumes.
- Lemmas rolled, hardened, enclosing palea, usually with some hairs, plump.
- Awns early deciduous, 1.5 cm long or less.

Key to Oryzopsis

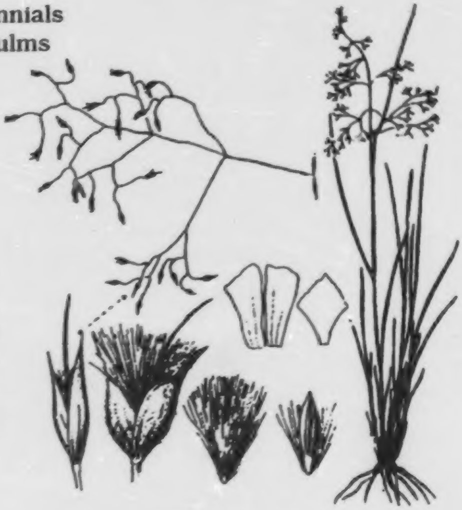
1. Panicles diffuse, branched; glumes long-pointed; lemmas with long white hairs; prairie species. *O. hymenoides*

Panicles narrow; glumes short-pointed to blunt; lemmas with short hairs; woodland species 2

2. Leaves flat, those of fertile stems short (to 1cm.); spikelets 6-8 mm. long. *O. asperifolia*

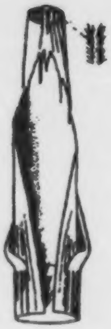
Leaves narrow (to 3 mm.), flat or rolled, not markedly dissimilar; spikelets 3-4 mm. long. *O. pungens*

Oryzopsis hymenoides (R. & S.) Ricker - Indian Rice Grass



Growth Habit: **Densely tufted** perennials with fibrous roots; culms **3-7 dm. tall,** thick-walled but hollow, hairless.

Blades: To 5 mm. wide, to 50 cm. long, light green, **usually strongly inrolled,** long-tapering, **thick and firm**, smooth to minutely roughened below, finely roughened to finely hairy on the prominent veins above; rolled at emergence.



Sheaths: Round, split, prominently veined, smooth to minutely roughened or hairy; margins overlapping, pale, **usually with a fringe of hairs at throat**; basal sheaths often purple-tinged.

Ligules: **To 8 mm. long**, membranous, **pointed**, often split, **very conspicuous**.

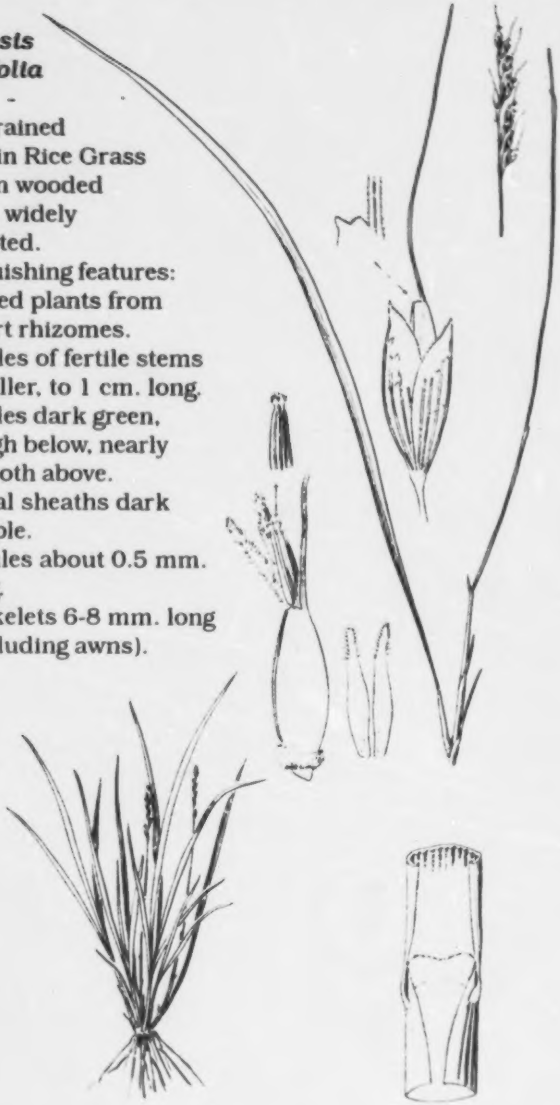
Collars: Indistinct, narrow, yellowish, **often with small tufts of hairs on margin**.

Auricles: Absent.

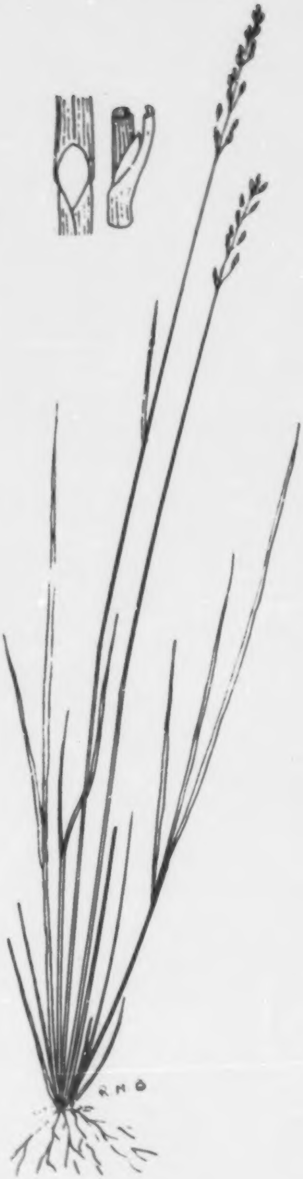
Heads: Panicles 8-16 cm. long, **open,** branches numerous, in pairs, branched, **spreading and flexible**; glumes **ovate-long-pointed, thin, papery**, with 3(5) greenish nerves, 6-7 mm. long, hairless to finely hairy; lemmas 3(4) mm. long, densely **long soft-hairy with white hairs, blackish at maturity**; awns 4-6 mm. long, early deciduous.

Similar Species:

1. ***Oryzopsis asperifolia*** Michx. - White-grained Mountain Rice Grass
Found in wooded regions, widely distributed.
Distinguishing features:
    - Tufted plants from short rhizomes.
    - Blades of fertile stems smaller, to 1 cm. long.
    - Blades dark green, rough below, nearly smooth above.
    - Basal sheaths dark purple.
    - Ligules about 0.5 mm. long.
    - Spikelets 6-8 mm. long (excluding awns).



2. ***Oryzopsis pungens*** (Torr.) A.S. Hitchc. - Short-awn Rice Grass
Frequent in the boreal forest, also occasional in montane/foothills areas. Grows in open, dry woods and clearings, in gravelly areas, especially common in Jack pine forests.
Differs from *O. asperifolia*
   - Plants more slender, to 5 dm. tall.
   - Blades to 3 mm. wide, flat to inrolled.
   - Ligules to 2 mm. long, hairy across the back.
   - Lemmas 3-4 mm. long, with an awn 0.5-2 mm. long.



Habitat & Distribution: Common in the prairies. Sporadic occurrences in open dunes in the parkland and boreal forest regions. Grows on dry exposed river banks, eroded slopes, in active dunes, sandy grassland.

Forage Value: Good, protein content peaks at 10-12% in the spring and drops to 7% at maturity and remains more or less constant until fall; plants cure on the stem exceptionally well, and are valued as winter forage; Indian rice grass is rated as one of our most palatable native grasses (although rating somewhat lower for sheep), especially relished early in the season and again in the fall when livestock often seek out the nutritious seed heads.

Grazing Response: A decreaser, and has disappeared as a prominent species in some areas, still common in well managed pastures and on sites where livestock access is difficult.

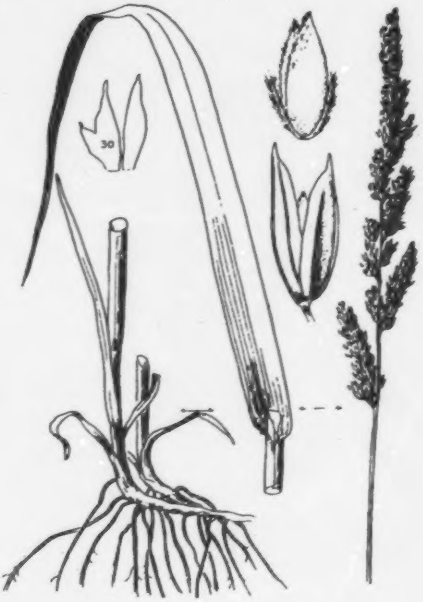
Notes: From *oruza*, rice, and *ospsis*, a suffix meaning "like"; the resemblance of the seeds to rice explains both the generic and common name; once an important food of North American natives (hence the name "Indian"), the seeds were gathered and ground into meal or flour; Indian rice grass is recommended for seeding on dry, sandy, or erodable slopes in the prairie region, tolerant of mild alkalinity and also possibly some salinity; plants establish quite readily, although the hard seed coat inhibits germination for about a year after maturity; *O. hymenoides* is a fairly prolific seed producer, but seed is difficult to handle unless coated.

PHALARIS L. - Canary Grass

Common Characteristics

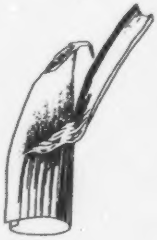
- Tall annuals or perennials.
- Blades flat, ligules long.
- Spikelets greenish, large, with one perfect terminal floret and 2 sterile small florets.
- Disarticulation above glumes, but sterile lemmas falling attached to fertile lemma.
- Fertile lemma shiny, hard, enclosing palea.

Phalaris arundinacea L. - Reed Canary Grass



Growth Habit: Perennials with **stout, long, scaly pinkish to yellowish rhizomes**; culms erect, **robust, 6-15 dm. tall**, hairless, smooth, glaucous, **much exceeding basal leaves**.

Blades: **To 15 mm. wide**, 10-30 cm. long, **flat**, long-pointed, **light green, usually glaucous**, veins fine; below, often finely roughened, midribs conspicuous; above, mostly smooth; margins roughened; rolled at emergence.



Sheaths: Round, split, hairless, pale green to yellow-green, **basal ones pink**; veins distinct; margins overlapping, pale.

Ligules: **To 5 mm. long**, membranous, pointed to blunt, **hairy below**, entire to split, often turned backward.

Collars: Narrow, divided or continuous and narrowed at midrib, hairless, yellow-green, usually oblique.

Auricles: Absent.

Heads: Panicles 6-18 cm. long, **narrow, dense to somewhat open and lobed during flowering**; glumes 4.5-5 mm. long, pale to pinkish, darker green on margins and keel, the keel slightly winged, finely roughened across back; **fertile lemmas 3-4 mm. long, shiny, slightly hairy at top**; sterile lemmas short, hairy.

Habitat & Distribution: Widely distributed in wet areas. Both native and introduced components common.

A wetland species, growing on shores, in depressions along roadways, in marshes and swamps.

Introduced into irrigated and periodically flooded areas as a forage species.

Forage Value: Good, with nutritional elements in good balance; plants are palatable in early spring but foliage becomes coarse and less attractive as the season advances; *Phalaris* is a fairly good hay species when cut in the early heading stage, protein content at 8-10%, and that of fiber about 37%; however, as with most wetland grasses, hay is light, and is best supplemented with alfalfa.

Grazing Response: An increaser, introduced varieties also common.

Notes: From the Greek *Phalaris*, the name for some grasses; *arundinacea* means "reedy"; the related species *P. canariensis* is used for canary seed, and has given rise to the common name; traditionally, the coarse leaves and stems were used by different groups of native people for a variety of purposes, such as rope and mat making and basketry; reed canary grass is useful in stabilizing wet areas, the plants tolerant of shallow flooding for 6-8 weeks, also persisting in mildly acidic and saline soils, but considered tolerant of only slight alkalinity; seed crops can be successfully grown on upland sites provided annual precipitation is at least 500 mm., or crops are irrigated; seed production is good, but heads shatter quickly once mature; *Phalaris* is often initially somewhat difficult to grow from seed, but plants grow quickly and spread readily by rhizomes once established.

PHLEUM L. - Timothy

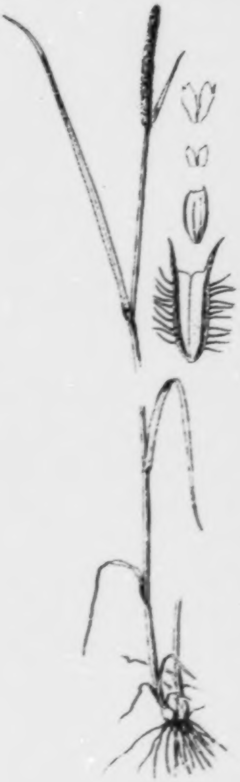
Common Characteristics

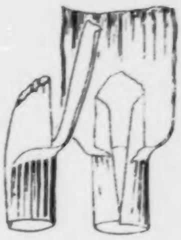
- Tufted perennials with flat leaves.
- Spikelets 1-flowered, disarticulating above glumes.
- Panicles spike-like.
- Glumes longer than lemmas, awn-tipped, hair-fringed on margins and keel.

Key to Phleum

1.	Base of culms bulbous-enlarged; sheaths not inflated; panicles elongate, 5-10 cm. long; awns on glumes not more than 2 mm. long; introduced.	*P. pratense*
	Base of culms not bulbous; upper sheaths inflated; panicles short-cylindric, 1.5-3 cm. long; awns on glumes more than 2 mm. long; native species of wooded regions.	*P. commutatum*

Phleum pratense L. - Timothy





Growth Habit: **Tufted** perennials with fibrous roots; **culms 4-9 dm. tall,** erect, smooth to minutely roughened above, growing from a **bulbous corm-like base.**

Blades: **To 12 mm. wide**, 5-25 cm. long, flat, long-pointed, smooth to lightly roughened and veiny on both surfaces, twisted, **light green, glaucous, succulent**; margins pale, roughened; rolled at emergence.

Sheaths: Round, split, distinctly veined, often purple-tinged at base; margins overlapping, pale; old basal sheaths brownish, **somewhat shredded** from disintegration of membrane between persistent veins.

Ligules: **To 3 mm. long**, membranous, blunt, entire or sometimes lacerate.

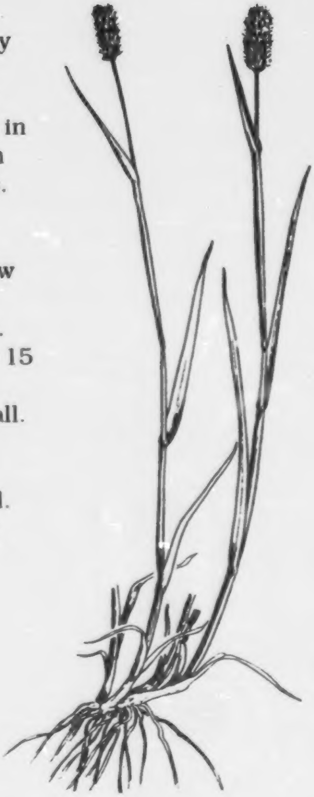
Collars: Medium broad, continuous, light green to yellowish, often oblique.

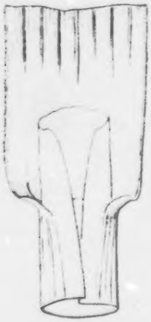
Auricles: Absent.

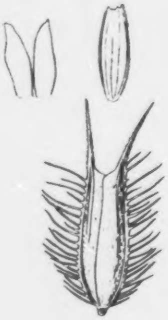
Heads: Panicles **5-10 cm. long, spike-like, 1-flowered**, spikelets disarticulating above glumes; glumes 3-4 mm. long, **hair-fringed on keel and margins, short-awn-tipped**; lemmas finely hairy, about 2 mm. long, truncate, jagged, mid-nerve usually prolonged, bristle-like.

Similar Species:

1. ***Phleum commutatum*** Gaudin - Mountain Timothy
   A native common in western regions, Cypress Hills, and in the extreme northeast. Grows in open woods, on slopes, and in montane and alpine meadows. Differs as follows:
   - Culms often reclining, sometimes producing a few rhizomes.
   - Culms not bulbous-based.
   - Blades 4-6 mm. broad, to 15 cm. long.
   - Smaller plants, 1-5 dm. tall.
   - Upper sheaths inflated.
   - Panicles 1.5-3 cm. long, short-cylindric/egg-shaped.
   - Glumes with awns over 2 mm. long.







Habitat & Distribution: A very common introduced species found in all regions with good annual precipitation.

Forage Value: Good, protein content as high as 20% in early spring, but drops rapidly, averaging 7-8% at maturity and 4-5% by late fall, making poor quality fall and winter pasture; timothy is very palatable throughout the season, especially when kept grazed off; although widely used as a hay species, it produces rather poor quality feed unless cut early and grown with legumes; it makes excellent hay for horses.

Grazing Response: An invader, Eurasian in origin, and now very common in the better moisture and soil zones, both because it has been grown so extensively, and because the species is a prolific seed producer and establishes readily on disturbances; an invasive species, often encroaching onto rangeland.

Notes: From the Greek *phleos*, the name for some reedy grasses, pratense, meaning meadow; named for Timothy Hansen, an early producer of the species for commercial purposes; *P. pratense* is useful in erosion control and soil stabilization, and has been seeded rather extensively for these purposes in better moisture zones; however, because of its invasive and persistent nature, timothy should be replaced by better quality native species when reclaiming sites in foothills grasslands.

POA L. - Bluegrass

Common Characteristics

- Mostly perennials, leaves ending in boat-shaped tips.
- Spikelets several flowered.
- Glumes shorter than lemmas, keeled.
- Lemmas awnless, less than 5 mm. long, with nerves faint, converging at tip.

Key to Poa

1. Plants from creeping rhizomes. 2

Rhizomes absent. 5

2. Culms wiry and distinctly flattened; introduced. *P. compressa*

Culms rounded or somewhat flattened. 3

3. Lemmas not pubescent, glabrous to slightly scabrous. *P. juncifolia*

Lemmas with at least some hairs. 4

4. Base of lemma without a cluster of cobwebby, crinkly hairs; lemmas often more than 4 mm. long; ligules pointed, 1-4 mm. long. *P. arida*

Base of lemma with cobwebby hairs; lemmas less than 4 mm. long; ligules to 1 mm. long, truncate. *P. pratensis*

5. Base of lemmas cobwebby-hairy. 6

Base of lemmas not cobwebby. 7

6. Leaves more than 8 cm. long and to 4 mm. wide; ligules to 4 mm. long; panicles open, 1-3 dm. long; lemmas usually bronze-tipped. *P. palustris*

Leaves to 8 cm. long and 1-2 mm. wide; ligules to 1 mm. long; panicles on shorter branches, ascending; lemmas not obviously bronze-tipped. *P. interior*

7. Lemmas glabrous to scabrous, without longer pubescence. 8

Lemmas with at least some pubescence. 9

8. Leaves very narrow, scabrous; spikelets flattened, lemmas keeled; panicles to 8 cm. long. *P. cusickii*

Leaves various; spikelets not distinctly flattened, lemmas not keeled; panicles more than 8 cm. long. *P. juncifolia*

9. Leaves short, flat, 2 mm. wide; panicles broad-pyramidal; spikelets flattened, often cordate-based. *P. alpina*

Panicles narrow and appressed. 10

10. Spikelets not flattened, lemmas not keeled. 11

Spikelets distinctly flattened, lemmas keeled. 12

11. Plants to 3 dm. tall; leaves less than 1 dm. long, blue-green and early withering; panicles less than 1 dm. long; lemmas to 4 mm. long. *P. sandbergii*

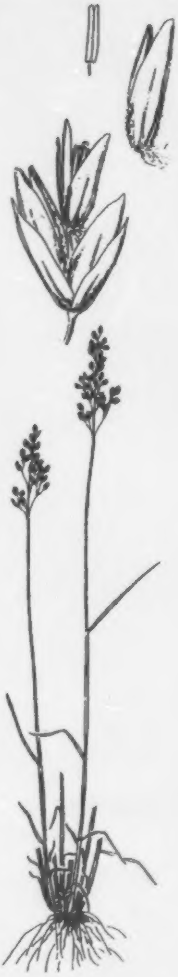
Plants mostly more than 4 dm. tall; leaves longer; panicles more than 1 dm. long; lemmas 4-5 mm. long. *P. canbyi*

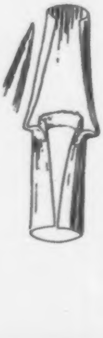
12. Plants often blue-green, stems stiff, wiry; panicles open but longer than broad; spikelets not cordate-based. *P. glauca*

Stems not wiry; panicles open, about as broad as long; spikelets cordate-based. *P. alpina*

Poa interior Rydb. - Inland Bluegrass

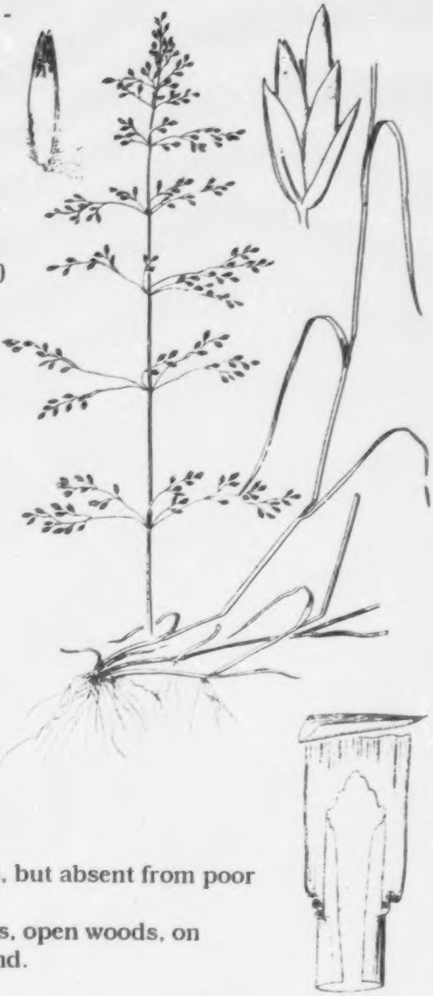
Growth Habit:	**Tufted**, with fibrous roots; culms erect, tufted, slightly roughened below panicles, **2-5 dm. tall**.
Blades:	**1-2 mm. wide, to 8 cm. long**, flat to inrolled, **somewhat lax**, roughened above and below and on margins, veiny below, boat-shaped at tip; folded at emergence.
Sheaths:	Rounded to slightly keeled, often roughened, open to near base, pale, **basal ones purple-tinged**; margins overlapping, pale.
Ligules:	**0.3-1 mm. long and truncate** (those on upper culms sometimes longer), jagged-fringed, finely hairy below.
Collars:	Indistinct, narrow, divided, pale green, hairless.
Auricles:	Absent.
Heads:	Panicles **4-10 cm. long**, branches ascending or somewhat spreading-pyramidal; spikelets **2-3 flowered, to 4 mm. long**; glumes ovate-lanceolate, pointed, shorter than first lemma; lemmas **to 3 mm. long**, keeled, with **most hairs on keel and marginal nerves, webbed at base**, sometimes sparsely so; lemmas purple-tinged, **not bronze-tipped or only faintly so**.





Similar Species:

1. ***Poa palustris*** L. - Fowl Bluegrass
Common, found in depressional grassland, on shores, in moist montane woods.
Differs as follows:
   - Blades broader (to 4 mm. wide) and longer (to 15 cm.).
   - Ligules longer, to 4 mm. long.
   - Collar margins somewhat thickened and protruding.
   - Panicles 1-3 dm. long, open, with whorled branches.
   - Lemmas usually distinctly bronze-tipped.



Habitat & Distribution:

Common in most areas, but absent from poor soils in the prairies.
Found in montane areas, open woods, on slopes, in open grassland.

Forage Value:

Good, with early spring nutrient levels acceptable, but these dropping steadily throughout the season; *P. interior* is palatable, especially in early growth stages, but is a poor forage producer and for this reason not classed as an important range species.

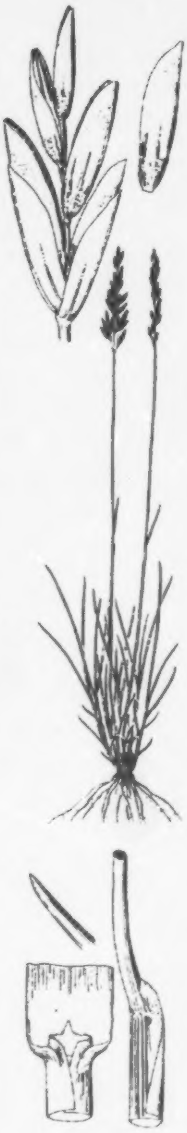
Grazing Response:

A decreaser, sometimes increaser #1, the shallow, non-rhizomatous root system not withstanding continued heavy use.

Notes: Syn. *P. nemoralis* var. *interior*; also known as interior bluegrass; the name "bluegrass", apparently first applied to Canada bluegrass (*P. compressa*) for its blue-green color, was later given to the entire genus; *P. interior* is useful in seed mixes in open woods in order to maintain species diversity; however, commercial seed may never be available in any quantities as the species produces relatively little seed and this is small and difficult to handle. *Note:* the similar *P. palustris* shows much more promise, often naturally moving onto disturbances in rangeland and providing quick stabilization and erosion control; *P. palustris* has the advantage of reproducing vegetatively to some extent as well as producing larger quantities of more viable seed; although a wetland species, seed crops can be successfully grown on upland sites in areas with good soils and moisture conditions, and limited quantities of seed are now commercially available.

Poa juncifolia Scribn. - Alkali Bluegrass

Growth Habit:	**Tufted** perennials, **rarely producing short rhizomes**, culms **5-10 dm. tall**, smooth.
Blades:	**To 1.5 mm. wide** and to 15 cm. long; blades on culms shorter; **inrolled, thick, stiff**, veins prominent, tips boat-shaped, smooth above, smooth to minutely roughened below, margins roughened; **pale-glaucous to blue-green**.
Sheaths:	Somewhat flattened, strongly veined, **shiny, smooth**, closed to no more than ¼ the length; upper pale green, the **lower stiff, yellowish to light pink**, old sheaths becoming fibrillose.
Ligules:	About **0.5 mm. long on leafy shoots, to 1.5-2 mm. long on culms**; membranous but thick, rounded to truncate, sometimes abruptly long-pointed, finely hair-fringed, **finely hairy on both surfaces**.
Collars:	Narrow, divided by midrib, yellowish, hairless.
Auricles:	Absent.
Heads:	Panicles narrow, 1-2 dm. long, branches ascending; **spikelets relatively large**, 3-7 flowered, **7-10 mm. long**; glumes minutely roughened, 3.5-4.5 mm. long; lemmas 4-5 mm. long, **rounded on back, finely roughened to very faintly hairy basally, not webbed.**



Related Species:

1. ***Poa ampla*** Merr. - Big Bluegrass
   The species can be split from *P. juncifolia* partly on habitat preferences, *P. ampla* in subxeric-submesic, open montane and foothills woods.
   Differs as follows:
   - Plants taller, 6-12 dm., bunches often larger.
   - Blades somewhat broader, to 3 mm., tending to be flat, those of leafy shoots 15-30 cm. long.

Habitat & Distribution:

Scattered, more common southward.
Found on moist, open, often alkali areas: in wet meadows, around sloughs, in depressional grassland.

Forage Value:

Good, with early spring protein content high and other nutrients in good balance, these values steadily dropping off by late season; plants are palatable in the spring but foliage becomes stiff and less attractive as the season advances; *P. ampla* is especially productive, where best adapted biomass estimates are similar to those of rough fescue.

Grazing Response:

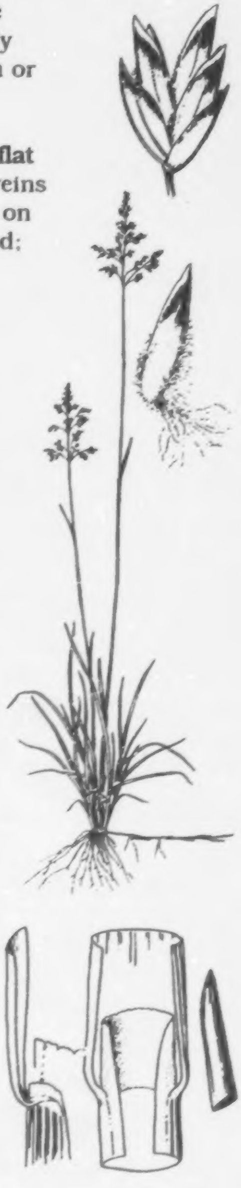
An increaser #1, although not rhizomatous, usually capable of maturing a seed crop because of lower late season palatability; *P. ampla* is a decreaser bunchgrass.

Notes:

Syn. *P. ampla*; the generic name *Poa*, in Greek, means grass; the Grass Family is sometimes alternately named *Poaceae*; the native elements of the *P. juncifolia* complex show natural tendencies to reclaim moist, alkaline sites; preliminary trials indicate that these strains have good germination and rapid growth, and show potential as early successional species for sites too alkaline to support other high quality grasses; although initially an early successional species, *P. ampla* persists into climax phases provided woody encroachment is not excessive; along with rough fescue, it forms dominant foothills/montane communities.

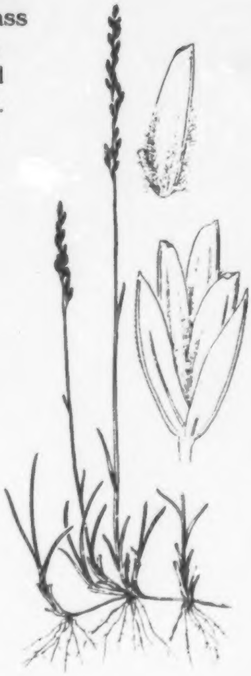
Poa pratensis L. - Kentucky Bluegrass

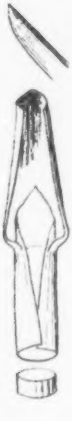
Growth Habit:	**Mat-forming** perennial, **from extensive creeping rhizomes**; culms erect, slightly compressed to **nearly rounded**, smooth or slightly roughened, 3-10 dm. tall.
Blades:	To 5 mm. broad, 5-40 cm. long, linear, **flat to folded**, keeled, **boat-shaped at tip**; veins distinct; smooth to minutely roughened on one or both surfaces, margins roughened; **dark green**; folded at emergence.
Sheaths:	Compressed but **not sharply keeled**, split for ½ their length, veins distinct, hairless, dark green, basal ones pale, rarely purple-tinged; margins pale.
Ligules:	**To 1 mm. long, truncate**, entire to slightly jagged and finely hair-fringed; often finely roughened-hairy.
Collars:	Narrow, divided by midrib, yellowish-green, sometimes indistinct.
Auricles:	Absent.
Heads:	Panicles **pyramidal, usually open**, lower branches of different lengths, in whorls of 5, 3-10 cm. long; spikelets **3-5 flowered**; glumes 2.5 (first) and 3 (second) mm. long, roughened on keel; lemmas **about 3.5 mm. long, hairy on keel and marginal nerves only, with abundant cobwebby hairs at base**; purple-tinged and sometimes (not consistently) bronze-tipped.



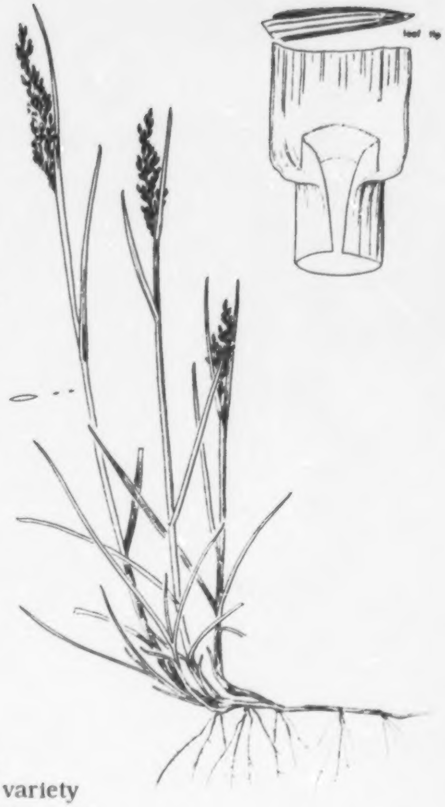
Similar Species:

1. ***Poa arida*** Vasey - Plains Bluegrass
Found sporadically across southern areas, also in the northern parkland region and in the extreme northeast. Not a common species, but in some areas, may be considered locally abundant. Grows in dry, often sandy grassland, and in moist saline areas.
Differs as follows:
   - Ligules pointed and entire, more prominent, 1-4 mm. long.
   - Lemmas with hairs on lower parts of intermediate nerves as well as on keel and marginal nerves.
   - Lemmas not webbed.



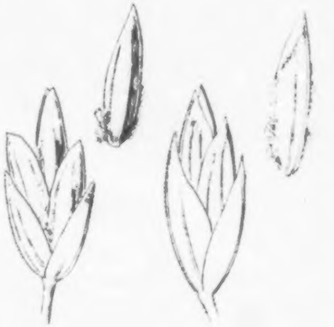


2. ***Poa compressa*** L. - Canada Bluegrass
   A non-native, found in disturbed areas, on shores, in moist grassland and in open woods.
   Differs as follows:
   - Sheaths and culms distinctly flattened.
   - Ligules to 2 mm. long.
   - Lemmas usually not webbed at the base; web, if present, sparse.



Note: Kentucky bluegrass is an extremely variable species, showing a variety of growth forms that result from environmental/micro-climatic conditions, and from genetic variations resulting from the presence of both natives and introduced cultivars. The two most extreme forms:

1. Low plants, to 20 cm. tall, leaves short but numerous, mostly in basal tufts; panicles short, relatively compact, lower branches in pairs.
2. Tall plants, 5-10 dm. in height, leaves elongate; panicles 8-10 cm. long, open-pyramidal, lower branches in whorls of 5.



Habitat & Distribution: Grows in open montane woods to alpine elevations, in montane and foothills grassland, in the boreal forest.

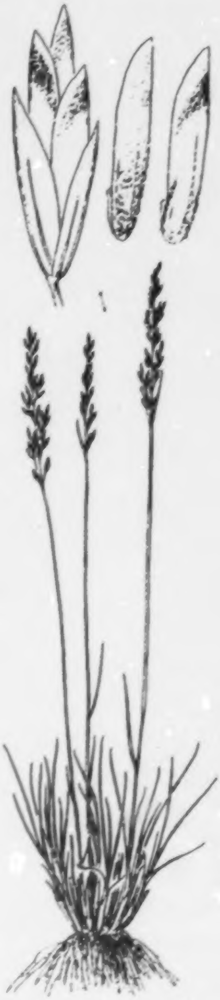
Found in moist meadows and depressional areas in the parkland region, and restricted to better soils and moist locations in the prairies, its presence in dry regions an indication of improved site conditions.

Forage Value: Good, protein content as high as 30% in early spring but drops rapidly by heading time and continues to fall throughout the season; plants do not cure on the stem, but do remain nutritious when moisture and continuous grazing stimulate regrowth; *P. pratensis* is palatable in early growth stages and when kept grazed down, but becomes stemmy and unattractive with light utilization, and brittle and dormant during dry weather.

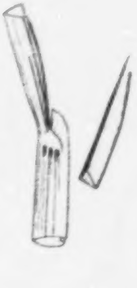
Grazing Response: An invader (or increaser in the case of native elements), introduced from Europe before 1700; Kentucky bluegrass is an aggressive species, now common in rangelands, often dominant in low-lying and heavily grazed areas, also completely replacing natives on abused upland sites in the Foothills Fescue grasslands.

Notes: The name *pratensis* means meadow, the species the state grass of Kentucky, traditionally considered to be particularly abundant in this state; the appropriately named "bluegrass" music originated in Kentucky with mandolin player Bill Monroe; Kentucky bluegrass has been seeded extensively because of its erosion control properties and also its ability to withstand low clipping, making the species a choice turf grass; however, because of its invasive and persistent nature, it should be replaced by indigenous species whenever disturbances occur on native rangeland. *Note:* Canada bluegrass (*P. compressa*) has also been widely used, its creeping root system with similar soil binding abilities, and the species more tolerant of infertile, moderately saline soils, and apparently with some curing properties; although Canada bluegrass is not as invasive as *P. pratensis*, native alternatives with similar adaptations should be substituted whenever possible in order to maintain a native species composition.

Poa sandbergii Vasey - Sandberg Bluegrass

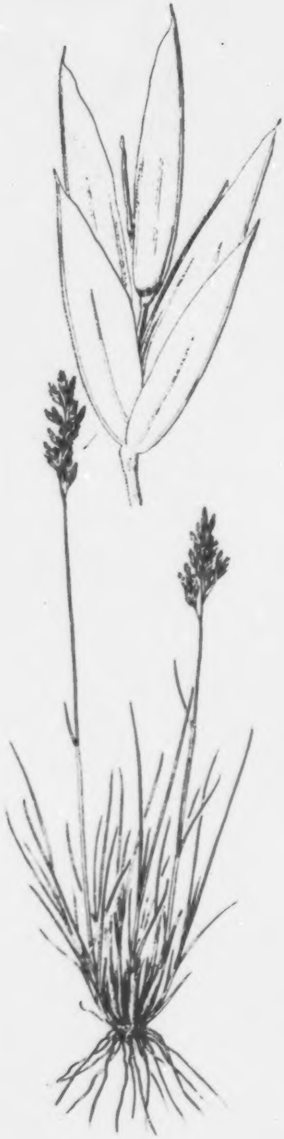


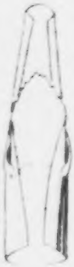
Growth Habit:	**Densely tufted** perennial with fibrous roots; culms **to 3 dm. tall,** hairless.
Blades:	Short, narrow, **to 2 mm. broad, 4 to 12 cm. long**, often numerous, **in basal tufts**, flat to folded, **twisted-curled at tips**, with boat-shaped tips; **blue-green but withering-tawny early in season**; margins and both surfaces roughened; veins prominent, often pale; folded at emergence.
Sheaths:	Compressed, split, smooth to slightly roughened, prominently veined, persistent, the **crown with numerous old whitish sheaths; basal sheaths purple-tinged**; margins overlapping, pale.
Ligules:	**About 3 mm.** long on culms, those of leafy shoots somewhat shorter; very **conspicuous**, pointed, membranous, entire to lacerate, finely roughened-finely hairy, at least below.
Collars:	Indistinct, divided, narrow, light green.
Auricles:	Absent.
Heads:	Panicles **4-8 cm. long**, branches mostly short and appressed; spikelets **not flattened**, usually purplish, 3-5 flowered; glumes 3-4 mm. long, slightly roughened on keels; lemmas **rounded on back, 3.5-4 mm. long, conspicuously hairy below**, especially on keel and margins, **not webbed**, red-purple-tinged.



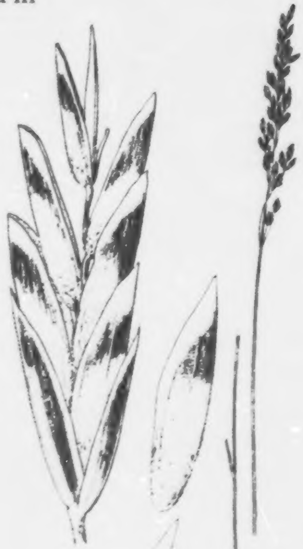
Similar Species:

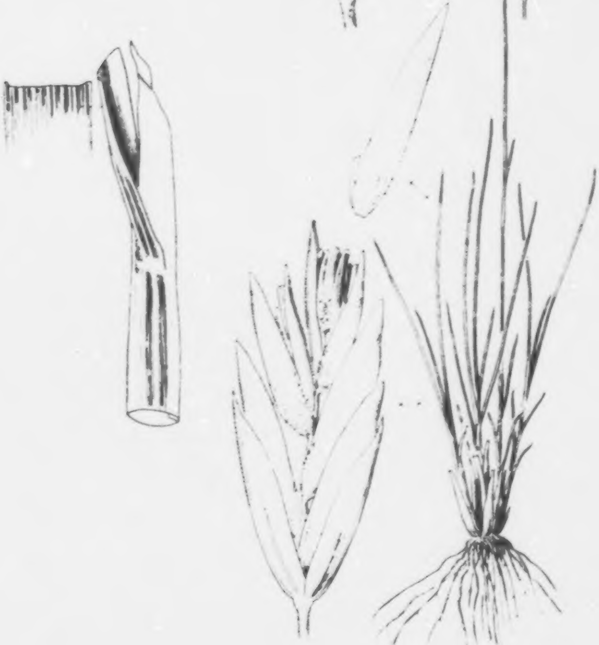
1. ***Poa cusickii*** Vasey - Early or Cusick Bluegrass
   Common in the south, also a disjunct population in the extreme northeast. Grows on open, dry slopes in the mountains and foothills, and in prairie grassland.
   Differs as follows:
   - Blades very narrow, inrolled.
   - Midrib on lower leaf surface with 2 white nerves.
   - Ligules short (to 1 mm. long).
   - Spikelets large (7-9 mm. long), pale and shiny at maturity.
   - Spikelets flattened, lemmas keeled.



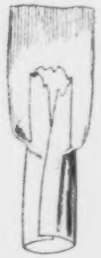


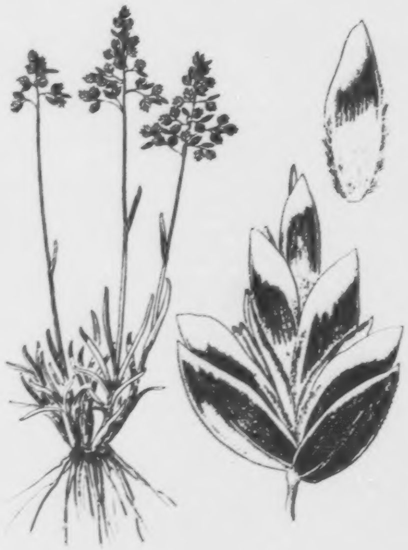
2. ***Poa canbyi*** (Scribn.) Piper - Canby Bluegrass
Common in the south, found in foothills and montane grasslands, restricted to depressional (and often moderately saline) sites in the prairies.
Differs as follows:
- Plants taller, over 4 dm. tall.
- Blades longer (to 20 cm.), mostly smooth below, and broader (to 4 mm. wide).
- Ligules often longer (to 5 mm.).
- Lemmas larger (4-5 mm. long).



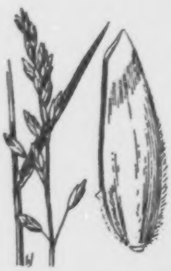


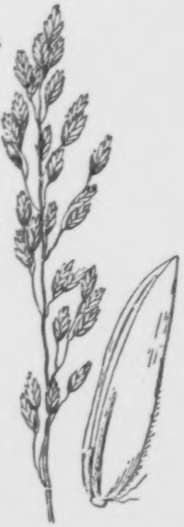
3. **Poa alpina** L. - Alpine Bluegrass
Found on rocky, often calcareous ridges, on rocky shores, along trails in foothills grasslands and into montane and alpine areas. Especially common in open subalpine meadows.
Differs as follows:
- Blades flat, 2-4 mm. wide, to 5 cm. long.
- Sheaths pale-tawny at the base.
- Ligules 1.5-3 mm. long.
- Panicles broad-pyramidal.
- Spikelets flattened, keeled, often heart-shaped at the base.





4. **Poa glauca** Vahl - Glaucous Bluegrass
Restricted to the southern Rocky Mountains and higher elevations in the boreal forest. Also known for the extreme northeast. Grows from low to subalpine elevations, on grassy slopes, on calcareous outcrops and ridges, in gravelly places.
Differs as follows:
- Plants more blue-green and glaucous.
- Stems stiffer, wiry.
- Ligules 1-2 mm. long.
- Lemma pubescence similar, but without basal web.





Habitat & Distribution:

Common in southern regions.
Grows in montane areas, and eastward throughout the prairies. Found on dry slopes, clay flats, and in dry prairie grassland; especially noticeable in years of drought when more desirable species die back. In the prairie region, an indicator of solonetzic and saline soils.

Forage Value:

Good, with early spring protein content as high as 25%, but this drops to about 10% by mid-June and to 4% by August; Sandberg bluegrass is palatable early in the season, and its very early growth provides some grazing before most other grasses green-up; foliage dries up and becomes unattractive by early summer, although late season moisture can stimulate a second lush, nutritious growth; it does, however, produce relatively small yields even when forming dominant cover.

Grazing Response:

An increaser and indicator of overgrazing; overall lower palatability, low growth habit (and in many cases growing below grazing level) and drought tolerance properties contribute to the species' ability to thrive when more desirable grasses decline.

Notes:

Syn. *P. secunda*; Sandberg bluegrass is of limited value as a reclamation species, although adaptation to drought and infertile, shallow, often alkali soils makes it useful in mixes with such species as western wheat grass and alkali bluegrass to stabilize poor sites. *Note:* The similar *P. canbyi* provides somewhat more forage, and may be a more desirable alternative in low-lying prairie sites; however, initial trials show the species to be rather difficult to establish, this, at least in part, due to poor germination.

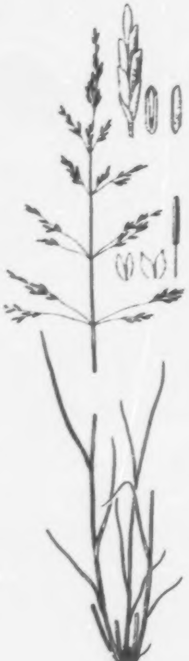
PUCCINELLIA Parl. - Alkali Grass

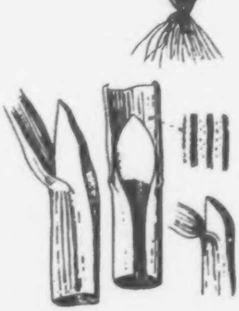
Common Characteristics

- Low, tufted perennials.
- Sheaths open.
- Panicles several flowered, glumes shorter than first spikelet.
- Lemmas to 3 mm. long, awnless, nerves parallel, not converging at tip, usually faint.

Puccinellia nuttalliana (Schult.) A.S. Hitchc. - Nuttall's Alkali Grass

Growth Habit:	**Tufted** perennials with fibrous roots; culms erect to ascending, 3-6 dm. tall, smooth.
Blades:	**To 3 mm. wide**, 5-18 cm. long, flat to inrolled, **blue-green and usually glaucous**, roughened above on the prominent veins, smooth below, margins roughened; rolled at emergence.
Sheaths:	Round, split, smooth, margins overlapping, pale, green, basal ones paler.
Ligules:	**To 5 mm. long**, membranous, pointed to blunt, entire, **hairy-roughened below.**
Collars:	Indistinct, narrow, pale green to yellowish.
Auricles:	Absent.
Heads:	Panicles to 2 dm. long, **branches roughened, ascending to spreading but not reflexed**; spikelets 4-7 flowered; glumes 1-2.5 mm. long, keeled; lemmas **2-3 mm. long, abruptly narrowed to an blunt, triangular, jagged-hair-fringed tip, nerves not prominent**, hairless.
Habitat & Distribution:	Common in central and southern regions, more sporadic northward. Found primarily on moist alkaline/saline areas: in depressional grassland, on slough margins and shores.





Forage Value: Good; early season nutrient content fairly high, but by maturity protein levels average 10-11%, and ash and fiber contents are relatively high; plants are palatable early in the season but become progressively less attractive, and value for both hay and pasture is limited as the species produces relatively little leafy growth and stands are usually rather sparse.

Grazing Response: A decreaser.

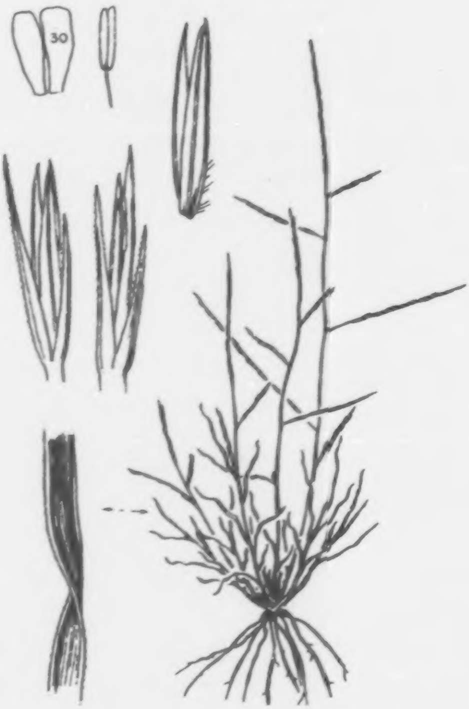
Notes: Syn. *P. airoides*; named for Benedetto Puccinelli, an Italian professor of botany; also called Nuttall's salt-meadow grass; P. *nuttalliana* is a valuable natural invader in disturbed alkaline and saline sites, and has been recently available on the commercial market, recommended for sites with infertile, highly alkaline or saline soils; it is probable that imported seed is a variety of the native P. *nuttalliana* or in some cases, a subspecies or separate but closely related species; it is generally fairly easy to establish and produces a considerable seed crop.

SCHEDONNARDUS Steud. - Tumble Grass

Common Characteristics

- Tufted plants with twisted blades.
- Panicles large, breaking off as "tumble-weeds" at maturity.
- Spikelets on 2 sides of 3-angled axis, 1-flowered, about 4 mm. long, lanceolate.

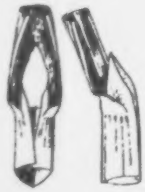
Schedonnardus paniculatus (Nutt.) Trel. - Tumble Grass



Growth Habit: **Tufted** perennials with fibrous roots, **forming large bunches by tillering** from the thick crown; culms reclining at base, 2-4 dm. tall, **slightly 3-angled**, minutely roughened.

Blades: To 2 mm. wide, **2-5 cm. long, folded, twisted and wavy**, roughened above and on margins and midrib, otherwise smooth below; **midrib and margins with thick white nerve**; light green to bluish; folded at emergence.

Sheaths: **Compressed and sharply white-keeled**, split, distinctly veined, very short, mostly hairless, margins broadly pale to purple-tinged.



Ligules: **To 3 mm. long**, membranous, pointed, conspicuous, continuous with sheath.

Collars: Divided, narrow, whitish.

Auricles: Absent.

Heads: Panicles **large, spreading**, often over half the plant height; panicle branches 3-angled, roughened, wavy, **the whole panicle breaking off at maturity, acting like a tumble-weed**; spikelets **distant, sessile**, appressed, **sunken in axis, 1-flowered, on 2 sides of 3-angled axis**; glumes lanceolate-very narrow, 2.5 (first) and 3.5 (second) mm. long; lemmas about 4 mm. long, narrow, roughened, long-pointed.

Habitat & Distribution: Widespread but rather sporadic across southern regions. Grows on dry, often poor soils, on waste and disturbed sites.

Forage Value: Poor, nutritional elements averaging somewhat lower than better range grasses; as well, palatability is only fair and the species produces relatively little forage.

Grazing Response: An increaser, due to both low palatability and the species' ability to produce wind-borne panicles which aids in seed dispersal.

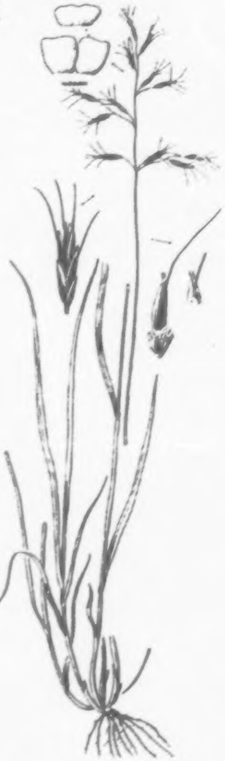
Notes: From the Greek *schedon*, near, and *Nardus*, a genus it is thought to resemble; only one species world-wide; tumble grass often naturally colonizes disturbances on poor, dry infertile soil, thus providing some cover and erosion control where better quality species might not establish; it is difficult to propagate, as little fertile seed is produced, and the hairiness of panicles pose some mechanical difficulties; thus, tumble grass may never achieve significant status on the commercial market as more productive and nutritious natives with similar adaptations become available.

SCHIZACHNE Hack. - Purple Oat Grass

Common Characteristics

- Loosely tufted perennials with sheaths closed, purple at base.
- Panicles lax, spikelets few, 3-5 flowered.
- Glumes shorter than lemmas.
- Lemmas 8-10 mm. long, hairy on callus, cleft at top, awned from just below teeth.

Schizachne purpurascens (Torr.) Swallen ssp. *purpurascens* (T.) S. - False Melic



Growth Habit: **Loosely tufted** perennial, bases reclining, **apparently producing short rhizomes**, culms 4-10 dm. tall, smooth.

Blades: **To 6 mm. wide**, 2-20 cm. long, **dark green, flat to folded**, narrow at base, long-pointed at top, distinctly veined, **always finely roughened above, smooth to minutely roughened below**, margins finely roughened; rolled at emergence.

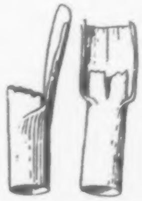
Sheaths: Round, slightly flattened, **closed in early stages**, often splitting with age, **purplish at base**, smooth to finely roughened.

Ligules: **To 1 mm. long**, membranous, truncate, lacerate to mostly entire.

Collars: Divided by midrib, narrow but distinct, light green-yellowish, often thickened.

Auricles: Absent.

Heads: Panicle **open, lax**, branches roughened, **drooping**, spikelets to 2 cm. long, **purplish and bronze-tinged**, 3-5 flowered; glumes **5 (first) and 7 (second) mm. long**, smooth; lemmas **8-10 mm. long, callus strongly hairy, tip cleft; awns arising from just below teeth, 10 mm. long or slightly longer**, somewhat spreading.



Habitat & Distribution: Common throughout.
A woodland species, found in aspen, mixed wood and coniferous forests, in montane areas, openings and clearings in wooded regions.

Forage Value: Poor, protein levels rated at less than 10% at most stages of growth, and fiber content is high; as well, the species is only moderately palatable, and produces relatively low yields of light, rather watery forage.

Grazing Response: An increaser #1, its abundance in many wooded regions probably more a result of poor palatability than actual aggressiveness of the species.

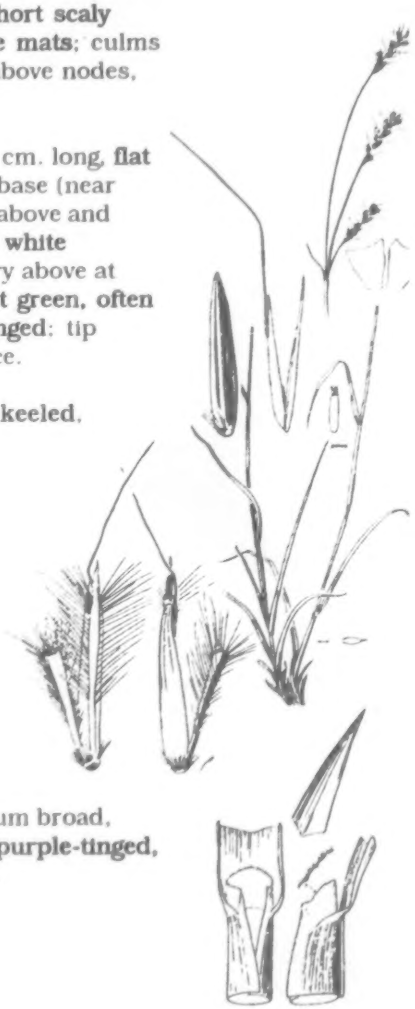
Notes: From the Greek *schizo*, split, and *achne*, chaff, alluding to the cleft tip of the lemma; *purpurascens*, a reference to the purplish color of panicles; also known as purple oat grass; false melic is of limited value in erosion control, and more important range species and those with superior stabilization properties are usually preferred in reclamation seed mixes.

SCHIZACHYRIUM Nees - Beardgrass

Common Characteristics

- Plants with short rhizomes, forming dense tufts.
- Collars, culms, leaves and sheaths red-purple-tinged.
- Ligule membranous, hair-fringed.
- Inflorescence partially included in sheath, axis white-hairy.
- Spikelets in pairs, one sessile, perfect and awned, the other stalked, sterile and with a shorter awn.

Schizachyrium ***scoparium*** (Michx.) Nees var. ***scoparium*** - Little Bluestem



Growth Habit: **Tufted** perennial, **with short scaly rhizomes, forming dense mats**; culms **wiry, purplish**, grooved above nodes, 2-7 dm. tall, hairless.

Blades: To 5 mm. wide and 5-15 cm. long, **flat to folded**, constricted at base (near collar), finely roughened above and below and on **thickened white margins**; often finely hairy above at ligules; veiny below; **light green, often glaucous** and **reddish-tinged**; tip blunt; folded at emergence.

Sheaths: **Distinctly compressed, keeled**, split and open in older leaves, often finely roughened, **purplish at base**; old sheaths **pale, persistent**, veins prominent.

Ligules: To 2 mm. long, membranous, blunt to truncate, finely hairy below, hair-fringed-jagged.

Collars: Divided by midrib, medium broad, hairless, **light green to purple-tinged, constricted on margins**.

Auricles: Absent.

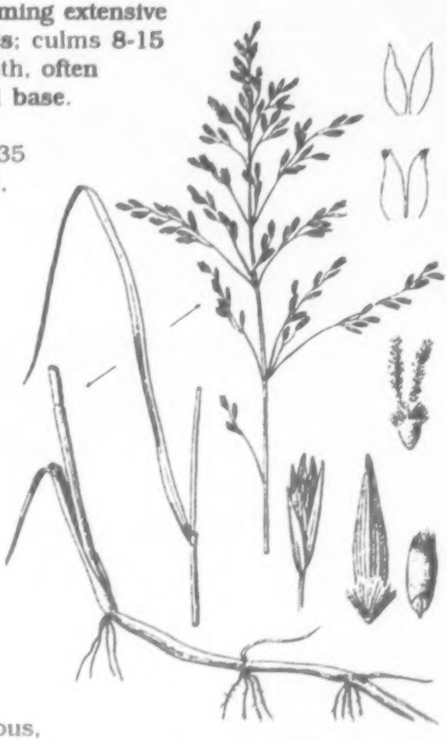
Heads:	Inflorescence a narrow raceme, the flower stalks very slender, **at least partially included in swollen sheaths**, each panicle branch ending in a single raceme 2-5 cm. long; **axis densely white-hairy, its joints hollow and cup-like at the tip**; spikelets **in pairs at nodes**, the **stalked one sterile, with a long-hairy stalk**, 4-5 mm. long, with **awns 1-4 mm. long; fertile spikelet sessile**, 7-9 mm. long, with **awns 10-13 mm. long, with a lower empty lemma and an upper fertile one**.
Habitat & Distribution:	Occasional in southern regions. Found in prairie grassland in dry, often sandy rangeland with a high water table, often associated with *Muhlenbergia cuspidata* on calcareous soils. One strong population follows the Bow River across most of Alberta, with occurrences sporadic in eastern regions, more abundant from Calgary to Banff National Park. Most of these are found on south facing slopes and where the water table is high or where seepages or discharge areas occur. Local populations frequently associate with *Helianthus nuttallii*, common tall sunflower.
Forage Value:	Poor, nutritional ratings averaging lower than good quality range grasses, protein levels at 14-16% in mid-May, dropping to 4% by mid-August and declining further by winter as plants do not cure on the stem; little bluestem is palatable only in early spring while foliage is lush, otherwise it is seldom grazed.
Grazing Response:	An increaser, although not an aggressive competitor, it will replace more desirable species with long-term heavy grazing on sites where it is best adapted.
Notes:	Syn. *Andropogon scoparius*. *Andr*, from the Greek "man", and *pogon* meaning beard, a reference to the hairy, stalked spikelets; *scoparius* means broom; also known as broom or prairie beardgrass, broomsedge; little bluestem is of limited value from a reclamation perspective, although sometimes is beneficial in stabilizing steep calcareous slopes where vegetation cover is often sparse.

SCOLOCHLOA Link - Spangletop

Common Characteristics

- Tall wetland grasses from extensive rhizomes.
- Blades flat to folded, to 10 mm. wide.
- Ligules conspicuous, to 8 mm. long, truncate, lacerate.
- Panicles large, spreading.
- Spikelets several flowered, glumes shorter than lemmas.
- Lemmas awnless, jagged-lacerate at top, bearded on callus.

Scolochloa festucacea (Willd.) Link - Spangletop

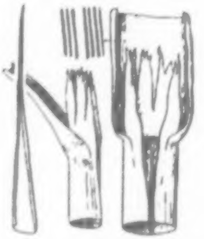


Growth Habit: Stout perennials, **forming extensive thick, fleshy rhizomes**; culms **8-15 dm. tall, thick**, smooth, **often purple-tinged toward base**.

Blades: **To 10 mm. wide**, 10-35 cm. long, flat to rolled, ridged and finely roughened above, smooth with obscure veins below, long-pointed, light green; margins pale; rolled at emergence.

Sheaths: Round, split, prominently veined, hairless, yellowish white, **basal sometimes purple-tinged**; margins overlapping, pale.

Ligules: **To 8 mm. long**, prominent, membranous, truncate, **lacerate**.



Collars: Indistinct, usually divided, hairless, yellowish to brownish-green.

Auricles: Absent.

Heads: Panicles **1-2.5 dm. long**, branches ascending to spreading, naked on lower half; spikelets **3-4 flowered; glumes shorter than first lemma**, smooth, **about 5 (first) and 7 (second) mm. long**; lemmas **awnless, jagged at top, densely hairy on callus**, about 6 mm. long; lemma nerves 7, prominent.

Habitat & Distribution: Scattered, more common in the parkland and boreal forest, occasional in foothills grasslands.
Growing on shores, in marshes, often in shallow water.

Forage Value: Fair, protein content at about 13% in early summer and dropping to 7-8% in the fall; the species does not cure on the stem, and like other wetland grasses, the foliage is soft and easily destroyed by frost; palatability is fairly good, although the long harsh stems tend to be wasty, and plants are often not easily accessed due to habitat; spangletop makes fair quality but light hay if cut early and if soil is not too wet to support machinery.

Grazing Response: A decreaser, resistant to moderate grazing but requires occasional rest to maintain stands; populations also tend to fluctuate because of rather specific moisture requirements; if flooding period is short (wetlands drying before mid-June) it will be replaced by such species as foxtail barley or western wheat grass, whereas if inundation is prolonged into summer, wetland sedges, manna grasses and cattails will dominate.

Notes: From the Greek *scolops* prickle, and *chloa*, a reference to grass; *festucacea*, because of the species' similarity to fescues; also known as white top; spangletop is useful in soil stabilization in areas prone to moderate flooding, establishing and spreading fairly quickly; it is also of some value in providing habitat for wetland wildlife; seed crops can probably be grown on upland sites in areas with good soil and moisture conditions, and the species also shows potential for propagation by root sprigs; fall seeding and planting are recommended, as wetlands are most likely to be dry enough to support machinery.

SITANION Raf. - Squirreltail

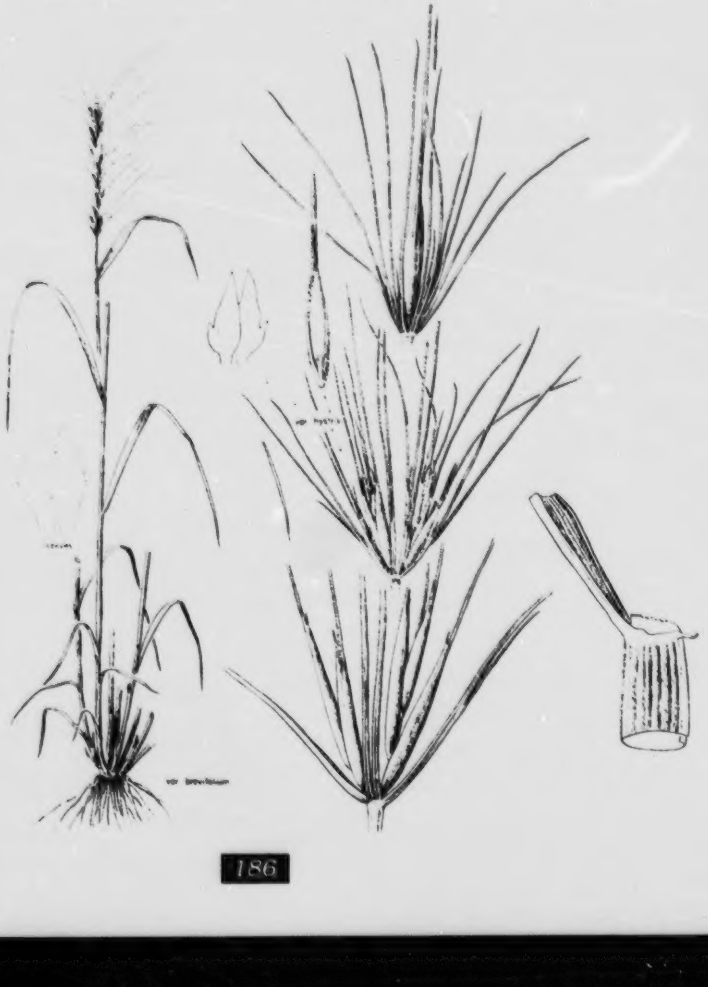
Common Characteristics

- Small tufted perennials, 1-5 dm. tall.
- Auricles present.
- Spikes with sessile spikelets, 2 per node.
- Axis disarticulating and breaking up at maturity.
- Glume awns sometimes cleft, 1-3 awns per lemma.

Sitanion hystrix (Nutt.) J.G. Smith - Squirreltail Syn. *Elymus elymoides*

Growth Habit: **Tufted perennials** with fibrous roots; culms mostly erect, 1-5 dm. tall, nearly glabrous to somewhat hairy.

Blades: To 3 mm. wide, 2-20 cm. long, flat to inrolled, acuminiate, veins distinct above and below, glabrous to finely hairy on both surfaces, **midvein and margins thickened, white**, margins scabrous; rolled at emergence.



Sheaths: Round, split part way, somewhat keeled above, distinctly veined, glabrous to soft-hairy, **basal ones purplish**; margins hyaline.

Ligules: To 1 mm. long, membranous, truncate, hair-fringed.

Collars: Divided by midrib, indistinct, light green, glabrous.

Auricles: **Clawlike, usually present.**

Heads: Spikes 2-10 cm. long, **often partially included in sheaths**, greenish to purplish, **breaking up at maturity; spikelets sessile, 2 per node; glumes very narrow, the awns rough, stiff, 5-9 cm. long, spreading**, often cleft; lemmas occasionally sterile, the fertile ones to 10 mm. long, glabrous, or more often finely hairy; awns 2-10 cm. long, divergent, two lateral nerves also often prolonged into awns to 5 mm. long.

Habitat & Distribution: Sporadic across southern regions.
Grows on open slopes, in open dry woods at higher elevations. Found in the prairie region in dry grassland, frequently on river flats and banks, in badlands, and on infertile soils.

Forage Value: Fair, nutrient levels averaging lower than those of good range grasses; palatability in early spring is moderate, but plants are seldom grazed once headed, the harsh awns unattractive and sometimes responsible for mechanical injury to livestock; squirreltail can provide some late season forage once seed heads shatter and if moisture is sufficient to stimulate regrowth.

Grazing Response: An increaser, although seldom abundant and rarely troublesome on good condition rangeland, the species appearing to perform best on exposed soil where other vegetation cover is sparse; naturally high populations do occur, and do not always indicate overgrazing.

Notes: Derived from the Greek *sitos*, meaning grain; also called bottlebrush squirreltail, bristle grass, bushtail, foxtail; *S. hystrix* is possibly of some value in stabilizing dry, infertile, moderately alkaline soils in the event that better quality grasses are poorly adapted; the stiff, rough awns will continue to impair commercial development of large quantities of seed.

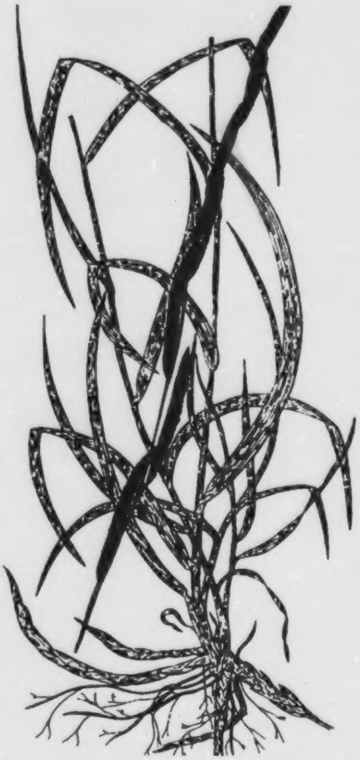
SPARTINA Schreb. - Cord Grass

Common Characteristics

- Robust rhizomatous perennials.
- Spikelets 1-flowered, stalkless, disarticulating below glumes.
- Spikelets in 4 or more spikes, in comb-like clusters, in 2 rows on one side of axis.

Spartina gracilis Trin. - Alkali Cord Grass

Growth Habit: Perennials with **long, thick, scaly, pale yellow (sometimes purple-tinged) rhizomes**; culms 3-6 dm. tall, erect, smooth, becoming **angled and sharply roughened in inflorescence**.



Blades: To 5 mm. wide, 5-40 cm. long, flat to inrolled, broad based, **long-pointed, firm,** roughened on the prominent veins above, smooth below; margins roughened; rolled at emergence.

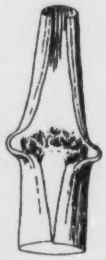
Sheaths: Round, split, veins distinct; hairless, yellowish to greenish, **sometimes purplish at base**; margins overlapping, pale.

Ligules: **1-1.5 mm. long, a fringe of hairs**.

Collars: Often divided by midrib, broad, yellowish with purple-brown margins, mostly hairless.

Auricles: Absent.

Heads: Inflorescence **of 4 or more spikes**; spikelets **sessile, 1-flowered, disarticulating below glumes**, compressed laterally, arranged in



comb-like clusters on one side of axis in two rows; glumes 5-6 and 7-9 mm. long, hair-fringed on keel, awnless; lemma 7-8 mm. long, hair-fringed on keel; **anthers purple, showy**.

Habitat & Distribution: Common in central and southern regions, sporadic northward. Found on moist areas: around sloughs, in depressional grassland, in moist draws on river breaks and badlands. Most frequent on saline or alkaline soils and sometimes on calcareous clays.

Forage Value: Poor, protein content low (at about 6%) during most of the season, and fiber content very high, averaging 40-41% at maturity; as well, palatability is low throughout the season due to the harshness of foliage.

Grazing Response: An increaser due to low palatability, the capacity of the species to reproduce rapidly from rootstocks, and adaptation to saline and alkaline soils that won't support many other species.

Notes: Taken from the Greek *spartine*, a cord made from one species, *S. juncea*; *S. gracilis* is recognized as having valuable soil binding properties on sandy shores and on saline or alkaline clays along water courses, generally out-performing introduced alternative species; it is probably most successfully propagated by root sprigs.

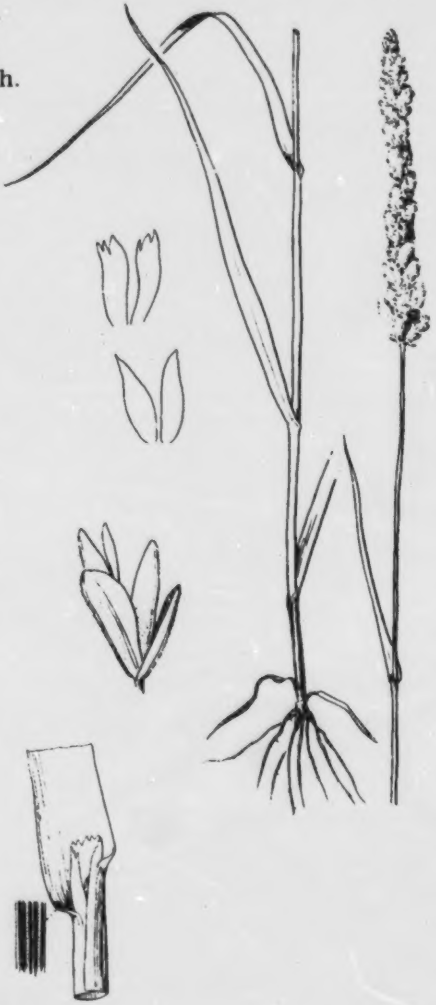
SPHENOPHOLIS - Wedge grass

Common Characteristics

- Tufted perennials.
- Panicles open to dense, spike-like.
- Spikelets mostly 2-flowered, disarticulating below glumes.
- Glumes distinctly dissimilar, the first small and narrow, the second nearly as long as the upper floret, broadly oval-obovate (wedge-shaped).
- Lemmas usually scabrous, firm, slender, obscurely nerved, awnless or with a short awn from below the apex.

Sphenopholis obtusata (Michx.) Scribn. - Prairie Wedge Grass

Growth Habit:	**Tufted** plants, usually densely so; culms 2-8 dm. tall, glossy, smooth.
Blades:	**2-5 mm. wide, flat, scabrous on veins on both sides**, sometimes hairy; veins prominent; margins scabrous; rolled at emergence.
Sheaths:	Mostly slightly scabrous, veins prominent; split; basal sheaths sometimes purple-tinged.
Ligules:	(1) **1.5-4 mm. long**, membranous, usually slightly scabrous externally, irregularly **erose-fringed, toothed**.
Collars:	Distinct, **oblique**, yellowish-tawny, divided by midrib.
Auricles:	Absent.



Heads:	Panicles 3-10 cm. long, **dense, spike-like, usually lobed**, branches erect, lustrous, tawny-greenish; glumes scabrous, the first 1-2 mm. long, **very narrow**, the second 1.5-2.5 mm. long, **broad and wedge-shaped**, flattened, **somewhat hooded**, veiny; spikelets mostly 2-flowered, lemmas oblong, 2-2.6 mm. long, **minutely papillose**, awnless or with a mucronate tip.
Habitat & Distribution:	Occasional, with a rather scattered distribution, mostly absent from the boreal forest. Grows in moist shrubby places, on shores, in depressional meadows.
Forage Value:	Good, palatable and nutritious, but rarely in such abundance as to contribute significant amounts of forage.
Grazing Response:	A decreaser, populations declining when wetlands are accessible and heavily utilized; unlike many strongly creeping grasses and sedges with with it associates, wedge grass lacks vegetative reproduction options when foliage and seed heads are grazed.
Notes:	From the Greek *sphen* - wedge, and *pholis* - scale, a reference to the shape of the second glume.

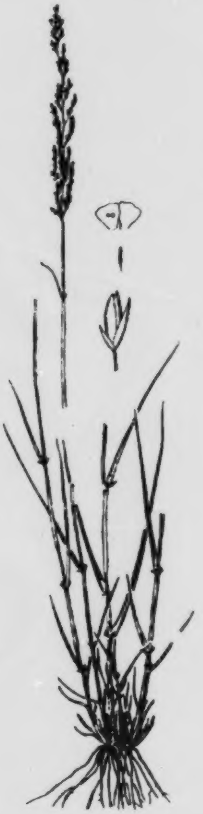
SPOROBOLUS R. Br. - Dropseed

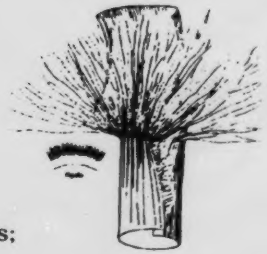
Common Characteristics

- Annuals or perennials with 1-flowered spikelets.
- Ligules small, a ring of hairs.
- Spikelets in panicles, to 3 mm. long, disarticulation above glumes.

Sporobolus cryptandrus (Torr.) A. Gray - Sand Dropseed

Growth Habit:	**Strongly tufted** perennials with fibrous roots; culms 3-8 dm. tall, sometimes **reclining at base**, solid and strongly grooved.
Blades:	To 5 mm. wide, 7-20 cm. long, flat to inrolled, long-pointed, **ascending on stems at about a 45° angle**; veins fine but distinct; roughened above and on pale margins, smooth to slightly roughened below; light green, stiff; rolled at emergence.
Sheaths:	Round, split, prominently veined, hairless, greenish, basal ones pale, often purple-tinged, **swollen at crown**; margins pale, **at least upper portion hair-fringed**.
Ligules:	**To 1 mm. long, a dense fringe of fine hairs**.
Collars:	Usually divided by midrib, broad, yellowish to dark-tinged, mostly hairless on back, **with dense tufts of long spreading hairs on margins**.
Auricles:	Absent.
Heads:	Panicles 10-20 (25) cm. long, open, branches ultimately spreading to reflexed, **basal portion usually included in sheath; spikelets to 3 mm. long**, borne to near base of branches, **dark leaden-green, sometimes purple-tinged, 1-flowered**, disarticulating above glumes;





lumes 1 (first) and 2.5 (second) mm. long, finely roughened; lemmas about 2.5 mm. long, pericarp early separating from seed, sometimes before seed is shed.

Habitat & Distribution: Scattered, more prevalent in southern regions.
Restricted to sandy soil: found in dry, open sandy woods, in open prairie grassland, in active dunes.
Frequently associated with *Calamovilfa longifolia* and *Oryzopsis hymenoides*.

Forage Value: Fair, with protein content never very high, averaging about 10-11% in early summer, dropping to 5% by fall; as well, fiber content during all stage of growth is higher than most associated grasses; although palatable in the southern states, the species rates as only moderately palatable locally, and is seldom consumed in the fall and winter in spite of its good curing properties.

Grazing Response: A decreaser; although not palatable, stands will decline on overgrazed range in favor of more competitive species such as sand grass.

Notes: About 40 species native to North America, but only three ranging northward into Canada; from the Greek *spora*, seed, and *ballein*, to throw, alluding to the species' tendency to drop seeds before maturity; sand dropseed is of some value in stabilizing loose, sandy soil, the seed reputed to have an exceptionally long life (seed buried in the soil for 20 years remaining highly viable), but the very hard seed coat requires scarification before satisfactory germination can be attained.

STIPA L. - Needle Grass

Common Characteristics

- Perennial bunch grasses.
- Plant bases swollen, slightly flattened and twisted at crown.
- Spikelets relatively large, in panicles, 1-flowered.
- Lemmas hardened, bearded on callus, with persistent twisted awns 2 cm. long or more.

Key to Stipa

1. Glumes to 30 mm. long; lemmas to 15 mm. long. 2

Glumes no more than 10 mm. long; lemmas to 6 mm. long. 3

2. Glumes 15-20 mm. long; lemmas 8-12 mm. long, rather evenly hairy; awns 10-15 cm. long, weak and flexible, 2-3 times bent and coiled. *S. comata*

Glumes 20-30 cm. long; lemmas 12-15 mm. long, bearded only at base and along margins, with vertical hairless patches; awns stiff, about twice bent. *S. curtiseta*

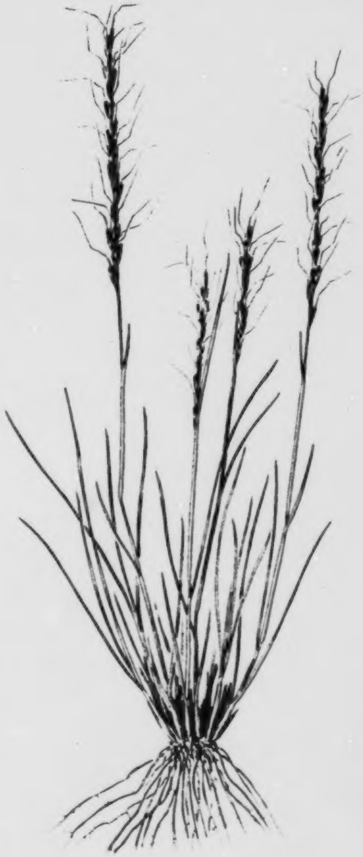
3. Panicles open, spreading (more appressed in hybrids with *S. columbiana*), awns hairy below. *S. richardsonii*

Panicles appressed, narrow. 4

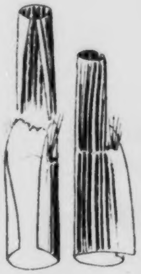
4. Sheaths hairy at the throat; lower panicle nodes hairy; lemmas plump, 5-6 mm. long, dark at maturity, the callus blunt; awns mostly hairless. *S. viridula*

Sheaths and panicle nodes glabrous; lemmas 4-6 mm. long, not darkening, the callus sharp-pointed, curved; awns hairy. *S. columbiana*

Stipa columbiana Macoun - Columbia Needle Grass



Growth Habit:	**Loosely to densely tufted perennials**; culms mostly glabrous, often finely hairy below nodes, 4-6 dm. tall.
Blades:	**1-3 mm. wide**, 10-25 cm. long, mostly inrolled, or those of culms sometimes flat; leaf tips **long-pointed, often reddish-tinged**; veiny and somewhat scabrous above and below; margins scabrous; rolled at emergence.
Sheaths:	Round, prominently veined, mostly glabrous, split, basal ones tawny, sometimes purple-tinged; margins overlapping, scarious, glabrous on margins and at throat.
Ligules:	**To 2 mm. long**, truncate to slightly notched, often slightly fringed-ciliate.
Collars:	Somewhat divided by midrib, narrow but distinct, yellowish, glabrous.
Auricles:	Absent.
Heads:	Panicles narrow, the branches appressed, **lower nodes glabrous**; glumes **about 1 cm. long**, acuminate, often purple-tinged; lemmas 4-6 mm. long, barely 1 mm. wide, **not consistently dark at maturity**, rather evenly hairy **except glabrous on tip of the long, sharp-pointed callus, this slightly curved**; awns twice bent, 2-3.5 cm. long, **finely pubescent**.



Habitat & Distribution: Widespread, growing throughout most Ecoregions. Found in moist fescue grasslands and open woods in western regions, Cypress Hills, and the north. Restricted to areas with adequate moisture and better soils in the prairie region (moist draws, snow melt areas).

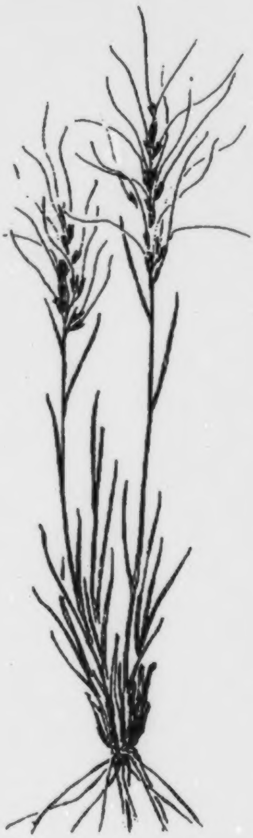
Forage Value: Good, with high spring protein values, and plants remain nutritious throughout the season and into winter as they cure well on the stem; palatability ratings are good as well, and remain above average; the sharp callus on seeds can cause some injury to livestock, but the weak awns are seldom troublesome.

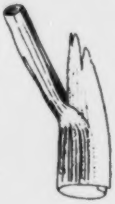
Grazing Response: A decreaser or in some regions an increaser #1; although resistant to moderate grazing pressure, continued heavy utilization will result in depletion of seed supplies and the consequent decline of the species.

Notes: Syn. *S. occidentalis* var. *nelsonii*; *Stipa*, from the Greek *stupe*, tow, a reference to the feathery appearance of awns on many species; also called subalpine needle grass, small mountain porcupine grass; the European species *S. tenacissima* was used in the manufacture of such products as paper, coarse cloth and baskets. Columbia needle grass has not attained the same status as green needle grass in reclamation work, but is a promising alternative for higher elevations, often naturally forming sterile hybrids with *S. richardsonii* where their ranges meet.

Stipa comata Trin. and Rupr. var. *comata* - Needle and Thread

Growth Habit:	**Densely tufted** perennials with fibrous roots; culms 3-7 dm. tall, sometimes hairy just below nodes; culms **spreading at maturity**.
Blades:	**To 3 mm. wide**, 5-30 cm. long, flat to inrolled, younger blades bristle-like, long-pointed; ridged and roughened above, smooth to roughened to finely hairy below, veins distinct; margins roughened; thick and firm, light green, rolled at emergence; **basal tufts**, especially seen in young plants, **often in a reclining rossette**.
Sheaths:	Round to slightly compressed, split, prominently veined, hairless, or finely hairy, especially lower ones; margins pale.
Ligules:	**To 5 mm. long, very conspicuous**, membranous, rounded to pointed, **usually split, often off-centre, sometimes hair-fringed**, finely hairy below, continuous with sheath margin.
Collars:	Narrow, often divided by midrib, hairless to finely hairy, light green, sometimes dark-tinged, often oblique.
Auricles:	Absent.
Heads:	Panicles 1-2 dm. long, **partially included in inflated sheaths**, contracted; glumes **15-20 mm. long**, tips long-pointed; **lemmas 8-12 mm. long**, sparsely but **evenly hairy above**, densely so on callus, pale at maturity; awns **10-15 cm. long, slender and flexible, indistinctly 2-3 times bent, often coiled above**, terminal segment more than 5.5 cm. long; awns finely hairy.



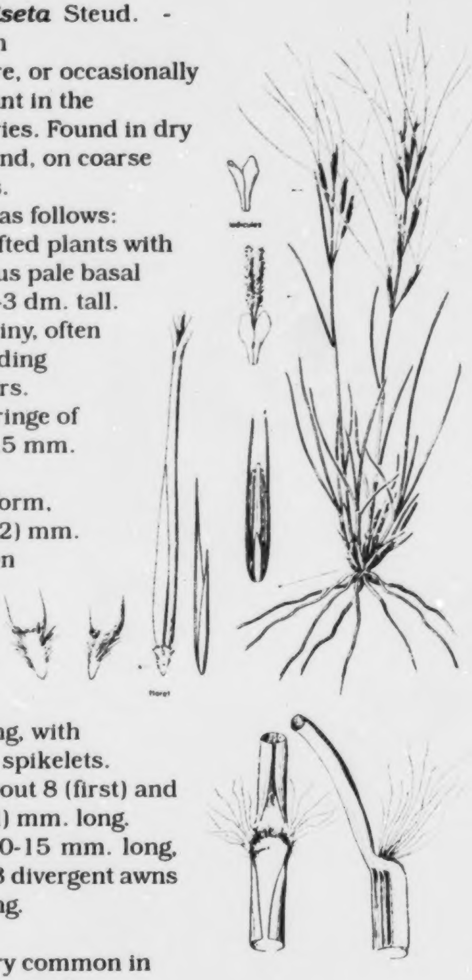


Related Species:

1. ***Stipa comata*** Trin. & Rupr. var. ***intermedia*** S. & T.
Differs as follows:
   - Panicles usually fully exserted.
   - Glumes 25-28 mm. long.
   - Lemmas 12-15 mm. long, terminal segment of awn straight, less than 5.5 cm. long.

Other Species:

1. ***Aristida longiseta*** Steud. -
Red Three-awn
In our area rare, or occasionally locally abundant in the southern prairies. Found in dry prairie grassland, on coarse soils on slopes.
Distinguished as follows:
   - Densely tufted plants with conspicuous pale basal sheaths, 2-3 dm. tall.
   - Sheaths veiny, often with ascending prickly hairs.
   - Ligules a fringe of hairs, to 0.5 mm. long.
   - Blades filiform, involute 1(2) mm. broad, often curled, scabrous above and below.
   - Panicles 4-8 cm. long, with 1-flowered spikelets.
   - Glumes about 8 (first) and 15 (second) mm. long. Lemmas 10-15 mm. long, firm, with 3 divergent awns 4-8 cm. long.



Habitat & Distribution:

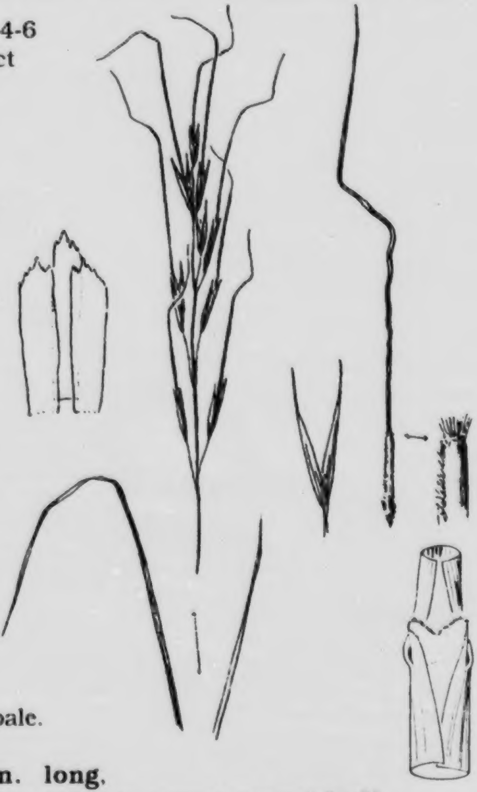
Variety *comata* very common in southern regions, sporadic northward. Variety *intermedia* uncommon throughout. Found in dry grassland, often in sandy and poor soils, on river breaks, on dry slopes. Considered to be a major climax species in the prairie region.

Forage Value: Good, spring protein content over 20%, dropping to about 5% by the time plants cure; *S. comata* is considered to be one of the most important grasses in the prairie region, with palatability rating high from early spring when plants green-up until winter, although leaves toughen by mid-summer, and animals will sometimes seek more lush forage; the sharp-pointed seeds have been known to cause mechanical injury to livestock but are usually avoided under normal conditions; needle and thread has been cut for hay in some regions and is rated good quality feed. *Note:* Red three-awn is rated as fair forage, moderately palatable when the often troublesome awns have been shed; further south it is often plentiful and in these cases is an important range grass.

Grazing Response: An increaser #I on better sites in the prairie region, a decreaser in drier areas and those with poor soils; although drought and frost tolerant, heavy grazing can reduce vigor and cover as well as depleting seed supply; leaves are apparently light compared to their length in the spring, indicating that grazing should be delayed until mid-June.

Notes: The specific name comata is from the Latin *coma*, head of hair, alluding to the tangled mass of awns; also known as spear grass, western needle grass; the unusually long, twisted awns are suggestive of a threaded sewing needle, hence the name needle and thread; the name "spear" originates with native children who used to play "spears" with the seeds; *S. comata* is recommended for re-seeding in the prairie region, often naturally reclaiming small or narrow disturbances in the absence of more competitive species; it is well adapted to moderate pH and lime content and also to poor and coarse soils; the twisted mass of awns produced causes problems when seeding, harvesting and cleaning seed, and is probably the biggest single reason little seed is available on the commercial market.

Stipa curtiseta (A.S. Hitchc.) Barkworth - Western Porcupine Grass



Growth Habit:	**Tufted** perennials, 4-6 dm. tall; culms erect to slightly outward spreading from crown; hairless.
Blades:	**To 5 mm. wide**, 5-30 cm. long, flat to rolled, long-pointed, ridged and roughened above, smooth to finely roughened, veiny below; **light green**; margins pale and slightly roughened; rolled at emergence.
Sheaths:	Round, split, prominently veined, pale, sometimes purple-tinged at base; margins pale.
Ligules:	**To about 2 mm. long**, membranous, blunt to truncate, **sometimes notched/ split in centre, finely but distinctly hair-fringed**.
Collars:	Continuous, yellow-green, hairless, often indistinct.
Auricles:	Absent.
Heads:	Panicles **exserted from sheaths**, 1-2 dm. long, narrow; **glumes 2-3 cm. long**, pale at maturity, long-pointed; lemmas **12-15 mm. long, brown at maturity, bearded at base and along margins, having vertical hairless patches**; awns 5-11 cm. long, **stiff, twisted, distinctly (usually twice) abruptly bent**.

Related Species:

1. ***Stipa spartea*** Trin. - Porcupine Grass
   Rare in central and southern regions.
   Differs as follows:
   - Taller, 4-8 dm. tall, culms with lower nodes hairy.
   - Blades longer, to 40 cm., often drooping.
   - Glumes 3-4 cm. long.
   - Lemmas 10-18 mm. long, awns 10-20 cm. long.

Habitat & Distribution:

Common in foothills and montane grassland, prairie and parkland regions, also in northern grasslands.
Grows in open grassland, frequently with *Festuca campestris* and *Festuca hallii*. Replaced by *Stipa comata* on very dry sites and on poor soils, and in the prairie region, an indicator of improved soil and moisture conditions.

Forage Value:

Good, nutritional elements rated similar to those of most good range grasses; plants cure well on the stem, by fall the calcium-phosphorus ratio is about 5:1, comparable to other desirable species; however, overall nutritive and curing properties rate somewhat below those of needle and thread; plants are palatable except during the period between emergence and dropping of seed.

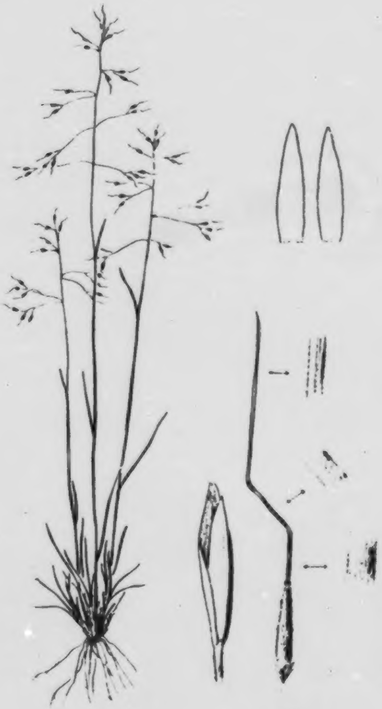
Grazing Response:

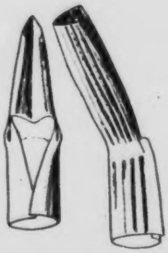
A decreaser except in best moisture and soil zones where classed as an increaser #I, typically replacing rough fescue under heavy grazing pressure; the fact that plants are avoided during seed formation is beneficial in ensuring adequate seed set.

Notes:

Also known as northern porcupine grass; the mature awns resemble porcupine quills, hence the name; members of the genus had rather limited value to native people, although awns of the similar *S. spartea* were apparently bound by the Blackfoot Indians for use as hair brushes; although not valued to the same extent as *S. comata*, *S. curtiseta* is an important component of many grasslands, thus is recommended in seed mixes, especially in the prairie and parkland regions; the species shows a natural tendency to establish well on disturbances but unfortunately, like needle and thread, the persistent awns make seed difficult to handle and will be a deterrent to development of the species on a commercial scale.

Stipa richardsonii Link - Richardson Needle Grass





Growth Habit:	**Densely tufted** perennials, with fibrous roots; culms smooth, 4-10 dm. tall.
Blades:	1-3 mm. wide, 15-25 cm. long, folded to inrolled, **very narrow**, smooth to roughened and indistinctly veined below, scabrous and more prominently veined above; margins scabrous; rolled at emergence.
Sheaths:	Slightly flattened, basal ones **swollen and slightly twisted**, glabrous to slightly hairy or roughened, split; pale green-yellow, old sheaths numerous, **persistent, glossy yellow-brownish**; margins overlapping, hyaline.
Ligules:	**To 0.5 mm. long**, membranous, slightly notched, **not ciliate**.
Collars:	Divided by midrib, yellowish-green, glabrous, narrow, indistinct.
Auricles:	Absent.
Heads:	Panicles **open**, 1-2 dm. long, the **branches drooping**, naked below, glumes 8-10 mm. long, **purplish, 1-flowered**; lemmas purplish-brown, 5-6 mm. long, finely hairy, less so toward apex; awns twisted, indistinctly twice bent, 2-3 cm. long, **distinctly hairy below, progressively less so upward**.

Habitat & Distribution: Frequent in the foothills/Rocky Mountain regions, occasional northward. Also in Cypress Hills.

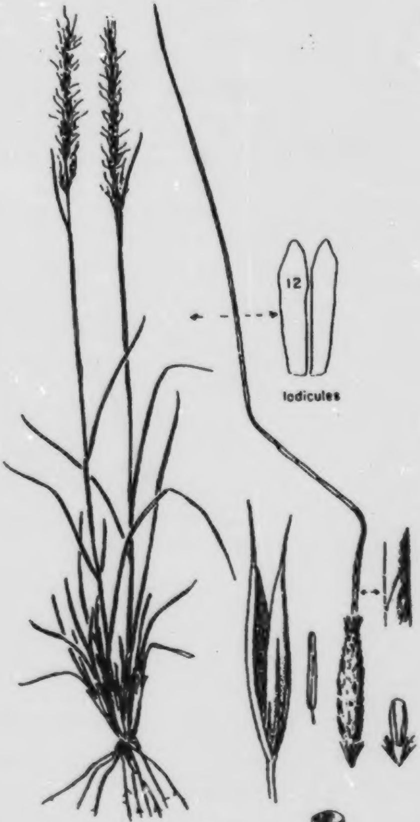
Found in fescue grasslands, open woods. Especially prevalent on gravelly river terraces where it typically associates with or replaces rough fescue as a dominant climax species on coarse fluvial soils and can be considered an indicator of these ecosites.

Forage Value: Good, plants nutritious and palatable for most of the season, although often avoided during heading; the species produces relatively large amounts of forage, also has some curing properties, providing good quality late season grazing.

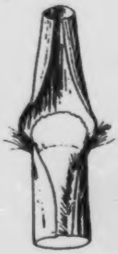
Grazing Response: A decreaser; because of its typical association with lower river terraces, *S. richardsonii* is especially vulnerable to heavy utilization that results from typical livestock concentration on these sites; consequently, there is both an impairment of seed formation and decline in vigor of vegetative growth.

Notes: As with other good quality grasses, efforts should be made to maintain and restore strong populations of Richardson needle grass, particularly on shallow, stony soils where less productive, inferior species often dominate.

Stipa viridula Trin. - Green Needle Grass



Growth Habit:	**Tufted** perennials; culms 4-8 (10) dm. tall, hairless to finely hairy, especially around nodes.
Blades:	**To 5 mm. wide**, 10-25 cm. long, flat to inrolled; **dark green, numerous**, prominently veined and roughened above, less so below but roughened at least on prominent midrib; margins roughened; rolled at emergence.
Sheaths:	Round, prominently veined, hairless to finely hairy, split, **long-hairy near throat and hair-fringed along upper margins**; basal ones pale to purple-tinged; margins overlapping, pale.
Ligules:	To about 2 mm. long (upper sometimes to 3 mm.), membranous, blunt to truncate, entire, sometimes hairy below.
Collars:	Somewhat divided by midrib, narrow, yellowish-green, **hairy across back**, and **usually more densely so on margins**.
Auricles:	Absent.



Heads: Panicles narrow, branches erect, **lower nodes long-hairy**, 10-25 cm. long, **greenish**, pale at maturity; glumes **7-10 mm. long**, sometimes purple-tinged, tips pale, abruptly long-pointed; lemmas **plump, 5-6 mm. long**, 1 mm. wide, **dark-tinged at maturity**, the callus **short and blunt**; lemmas rather evenly hairy, terminal and basal hairs somewhat longer; awns 2-3 cm. long, **mostly hairless**, twice abruptly bent.

Habitat & Distribution: Found in open montane and foothills grassland, in parkland areas. In the prairie region it is restricted to deeper, more fertile soils, heavy clays, and sometimes on sandy soil if the water table is high.

Stipa viridula does not grow on very dry prairie grassland, and where poor soils dominate.

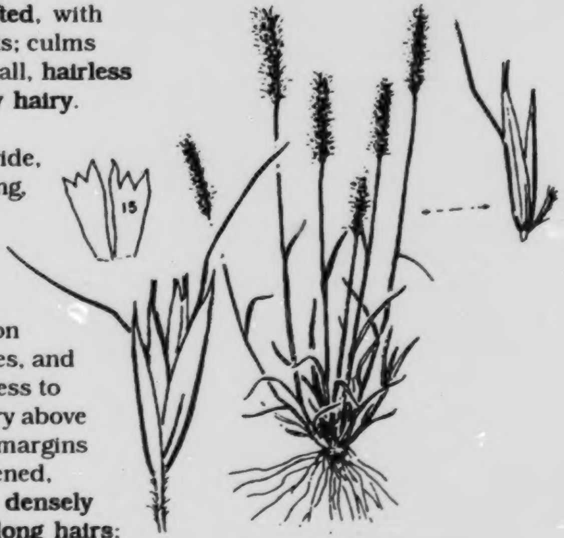
Forage Value: Good; spring protein content is often over 20% and curing properties are exceptional, with protein levels as high as 8% by fall; considered to be the most palatable member of its genus, green needle grass provides lush forage from early spring until winter; as well, the callus on seeds is atypically blunt and seldom troublesome, although livestock will still often avoid seed heads; *S. viridula* produces good quality hay, and yields are generally high.

Grazing Response: A decreaser, or sometimes an increaser #1: reputed to be cold and drought tolerant as well moderately resistant to grazing, but continued early season use can prevent the formation of sufficient seed heads to replenish stands.

Notes: The Latin *viridula* is a diminutive of the word *viridis*, meaning green, both this and the common name a reference to the green color of foliage and heads; also known as green feather grass; often a pioneer on disturbances in rangeland, green needle grass shows fairly good competitive ability and germination is generally high; seed is now commercially available in the U.S., the improved cultivars showing superior yields, vigor, and regrowth; as with other *Stipa* species, the persistent awns can be troublesome and remain a deterrent to production of local seed.

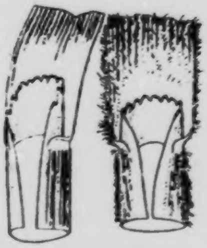
TRISETUM Pers. - Trisetum

Trisetum spicatum (L.) Richt. - Spike Trisetum



Growth Habit: **Densely tufted**, with fibrous roots; culms 10-50 cm. tall, **hairless to variously hairy**.

Blades: To 5 mm. wide, 3-15 cm. long, flat to inrolled, veins distinct, roughened on both surfaces, and nearly hairless to densely hairy above and below; margins pale, roughened, **sparsely to densely hairy with long hairs**; rolled at emergence.



Sheaths: Round, **split part way down,** keeled above, veins distinct, **nearly hairless to densely hairy**; margins pale.

Ligules: 0.5-2 mm. long, membranous, blunt, **jagged-hair-fringed**, lacerate, usually hairy below.

Collars: Narrow, often divided by midrib, light green to yellowish, often indistinct and obscured by hairs; hairless to hairy.

Auricles: Absent.

Heads: Panicles **contracted, spike-like to somewhat interrupted**, 5-15 cm. long, tawny-greenish to purple-tinged; glumes **slightly unequal**, the **first abruptly long-pointed; lemmas bearded at base, 4-5 mm. long**, finely roughened, with abruptly bent and spreading awns 5-6 mm. long, arising about 1.5 mm. from tip of cleft apex; anthers to 1.5 mm. long.

Related Species:

Trisetum spicatum belongs to a complex of extremely variable forms, from tall plants at lower elevations to dwarf individuals in alpine situations. As well, amount of hairiness varies greatly. Three subspecies are recognized:

1. Ssp. ***spicatum***: Florets exceed both glumes, culms long soft-hairy.
2. Ssp. ***molle*** (Michx.) Hult.: Florets only slightly longer than glumes, culms short hairy above, hairless below.
3. Ssp. ***majus*** (Vasey) Hult.: Florets similar to ssp. *molle*, but culms hairless.

Habitat & Distribution:

Common in foothills, montane and boreal forest regions. Grows in moist grassland in foothills and montane regions, in open woods, on high, open rocky and often calcareous alpine slopes.

Forage Value:

Fair, nutritional elements at acceptable levels, but palatability apparently varying from one region to the next, and depending on abundance of other choice species; although a relatively low yielding grass, trisetum can provide fair quantities of forage in some montane and subalpine areas where grazed primarily by deer and goats; growth begins early, and plants remain green until fall.

Grazing Response:

A decreaser, resistant to moderate grazing and trampling, but not able to withstand continued heavy use; although plants stool to some extent, they rely primarily on seed for propagation, this produced in relatively small quantities and reputed to have poor germination.

Notes:

From the Latin *tres*, three, and *seta*, bristle, referring to the three awns characteristic of lemmas of the type species; spicatum alluding to the spike-like panicle; *T. spicatum* is a pioneer in disturbed areas and along trails at high elevations and in the northern boreal forest, adapted to cold temperatures and tolerant of infertile, moderately acidic and alkaline soils; spike trisetum is recommended for revegetation in these areas, and although little seed is available, it is currently under development.

CYPERACEAE - Sedge Family

Common Characteristics

- Grass-like or rush-like, mostly perennial plants, with fibrous roots or rhizomes.
- Culms solid, often 3-sided, nodes indistinct.
- Leaves 3-ranked, sometimes reduced, usually hairless, margins roughened.
- Sheaths closed.
- Flowers often unisexual.
- Perianth of scales, bristles, or lacking.
- Stamens mostly 3, pistil 1, style 1, 2, or 3-divided.
- Fruit a flattened or 3-sided achene.

Key to Cyperaceae

1. Flowers imperfect. 2

   Flowers perfect. 3

2. Perigynium not completely enclosing achene. *Kobresia*

   Perigynium surrounding and enclosing achene. *Carex*

3. Stems without leaves; tubercle present on top of achene. *Eleocharis*

   Tubercles absent. 4

4. Woolly bristles (perianth) present, surrounding achenes. *Eriophorum*

   Bristles small, few, not woolly. *Scirpus*

CAREX L. - Sedge

Common Characteristics

- Culms usually 3-sided.
- Leaves 3-ranked.
- Inflorescence of 1-many spikes.
- Flowers unisexual, usually on same plant.
- Achenes enclosed in a membranous perigynium.

Key to Carex

1. Spikes usually solitary. .... Group 1

   Spikes usually more than one. 2

2. Stigmas 2; achenes flattened-lens shaped. .... Group 2

   Stigmas 3; achenes 3-sided. .... Group 3

Group 1

1. Small plants to 3 dm. tall; stigmas 2; achenes flattened-lens shaped. 2

Plant size variable; stigmas 3; achenes 3-sided. 4

2. Bog plants with long slender rhizomes; plants either staminate or pistillate. *C. gynocrates*

Plants with short rhizomes or none; spikes androgynous. 3

3. Perigynia sessile, nerveless, 2-2.5 mm. long; bog species (often calcareous). *C. capitata*

Perigynia stalked, striate, about 3 mm. long; mountain species of xeric sites. *C. nardina*

4. Spikes entirely pistillate or staminate; perigynia hairy; of moist,often calcareous sites. *C. scirpoidea*

Spikes mostly androgynous. 5

5. Plants from extensive rhizomes, purplish at the base; perigynia glabrous, firm, glossy; prairie species. *C. obusata*

Plants without rhizomes or tufted from short rhizomes; perigynia not shiny. 6

6. Plants densely tufted; perigynia to 4 mm. long, somewhat hairy; species of dry grassland. *C. filifolia*

Plants less densely tufted; perigynia glabrous; western species. 7

7. Plants to 4 dm. tall, with brownish-conspicuous old sheaths, leathery rough leaves; perigynia nerveless (2-keeled), 5-7 mm. long; species of open montane woods. *C. geyeri*

Plants small (to 12 cm.), old leaves early-withering-curling; perigynia finely nerved, 3-4 mm. long; of dry ridges. *C. rupestris*

Group 2

1. Lateral spikes sessile, not elongate; terminal spike usually gynaecandrous. 2

Lateral spikes either stalked, or sessile and distinctly elongate; terminal spike gynaecandrous and the lateral spikes stalked, or staminate. 14

2. Perigynia white-pitted (under magnification); perigynia not wing-margined, the bases often spongy; mostly of moist to wet places. .... Group 4

Perigynia not white-pitted. 3

3. Rhizomes well developed, the culms arising singly or a few together; heads tending to be dioecious or the terminal androgynous. 4

Rhizomes short or absent; culms densely tufted. 9

4. Culms branching-reclining, producing new culms from axils; species of sphagnum bogs. *C. chordorrhiza*

Culms not branching-reclining; species rarely in spagnum bogs. 5

5. Perigynia with distinct wing-margins, the beaks cleft (bidentate); terminal spike gynaecandrous, the lateral usually entirely pistillate or staminate; widespread, upland species. *C. siccata*

Perigynia not wing-margined, the beaks not distinctly bidentate. 6

6. Plants from tough fibrillose rhizomes; culms rough, stout, firm; upper sheaths striate and green ventrally; spikes numerous in a dense cylindrical head; perigynia with thin margins above, nerved on both surfaces; of wet places. *C. sartwellii*

Upper sheaths brownish-hyaline ventrally; heads not numerous; perigynia without thin margins. 7

7. Small upland plants, culms smooth. 8

Taller plants of moist to wet places; culms rough above; rhizomes black. *C. praegracilis*

8. Plants usually dioecious; anthers 3-4 mm. long, perigynia exceeded by scales, 3.5-4 mm. long. *C. douglasii*

Plants monoecious, androgynous; anthers 2 mm. long; perigynia about as long as scales, to 3 mm. long. *C. stenophylla*

9. Spikes androgynous. 10

Upper spikes gynaecandrous (occasionally staminate), the lateral pistillate or gynaecandrous. 12

10. Spikes 4-8, closely aggregated into a head; sheaths brown-blackish; upland species. *C. hoodii*

Spikes more numerous; sheaths with at least some red ventrally; species of swamps and bogs. 11

11. Heads erect, dense, dark brownish; perigynia to 2.7 mm. long, glossy, dark, spreading at maturity, convex on the inner face; scales shorter than perigynia; sheaths not copper-tinged at summit. *C. diandra*

Heads open, pale tan-brown; perigynia to 3.5 mm. long, not glossy, not spreading, flat on the inner face; scales as long as perigynia; sheaths copper-tinged at the summit. *C. prairea*

12. Perigynia with narrow to conspicuous wing-margins, the lower portion not spongy. .... **Group 5**

Perigynia without evident wing-margins; the lower portion spongy. **13**

13. Slender but wiry plants 2-5 dm. tall; leaves firm; perigynia spreading at maturity; plants of wet places. *C. interior*

Plants lax-spreading, 2-8 dm. tall; blades grass-like, lax; perigynia appressed; woodland species. *C. deweyana*

14. Perigynia fleshy, rounded, orange-brownish at maturity, beakless; small plants of moist places. *C. aurea*

Perigynia flattened, greenish to copper/purple-tinged, short-beaked; large wetland species. .... **Group 8**

Group 3

1. Perigynia glabrous. **2**

Perigynia pubescent to scabrous-granular. **9**

2. Sheaths pubescent; perigynia 12-20 ribbed; large wetland species. *C. atherodes*

Sheaths glabrous; perigynia with fewer or no conspicuous ribs. **3**

3. Perigynia 8-10 ribbed, with a prominent bidentate beak; large wetland species. *C. rostrata*

Plants without above combination of characteristics. **4**

4. Bracts, at least lowest, short-sheathing or sheathless. **5**

Bracts (lowest) long-sheathing along stems. **7**

5. Roots yellow-felty; terminal spike staminate; perigynia pale tawny to glaucous; bog/fen species. **6**

Roots not yellow-felty. .... **Group 6**

6. Rhizomes deep-seated, culms tufted; plants not glaucous; pistillate scales long-pointed, narrower than perigynia, early deciduous; perigynia with minute beak; staminate spike to 12 mm. long; of sphagnum bogs. *C. paupercula*

Rhizomes shallow and stolon-like, culms often arising singly; plants glaucous; pistillate scales about the size of perigynia, not early deciduous; perigynia with short but evident beak; staminate spike 1-3 cm. long; of sphagnum bogs/fens. *C. limosa*

7. Perigynia beak bidentate, about equal in length to perigynia; scales pale; long-pointed; found in moist (upland) grassland. *C. sprengelii*

Perigynia not long-beaked. 8

8. Plants tufted, rootstocks short; pistillate spikes drooping on very fine, hair-like stalks; perigynia to 3.5 mm. long; widespread, of moist places. *C. capillaris*

Plants with extensive rootstocks; pistillate spikes erect, sometimes drooping, on long, fine stalks; perigynia to 5 mm. long; often in wet black spruce sites. *C. vaginata*

9. Achenes filling upper portion of perigynia. .... **Group 7**

Achenes not evidently crowded in the upper portion of perigynia. 10

10. Large rhizomatous wetland sedges; leaves septate-nodulose; perigynia to 5 mm. long, strongly ribbed. 11

Smaller plants of woodlands. 12

11. Leaves involute, mostly less than 2 mm. broad. *C. lasiocarpa*

Leaves flat, broader (2-5 mm.). *C. lanuginosa*

12. Staminate spikes 8-25 mm. long; stigmas elongate; pistillate scales equalling perigynia. *C. richardsonii*

Staminate spikes 3-6 mm. long; stigmas short; pistillate scales about ½ as long as perigynia. *C. concinna*

Group 4

1. Very slender plants, perigynia small, few; spikes androgynous; of wet places. *C. disperma*

Spikes gynaecandrous. 2

2. Leaves 2-4 mm. wide, glaucous; perigynia 10-30 per spike, beaks very short; widespread, wet places. *C. curta*

Leaves narrow (1-2 mm. wide), not glaucous; perigynia fewer (5-10) per spike, beaks evident, often in sphagnum sites. *C. brunnescens*

Group 5

1. Bracts conspicuous and surpassing heads. *C. athrostachya*

Bracts not surpassing heads. 2

2. Perigynia beaks rounded (terete), rarely serrate or bidentate (sometimes weakly bidentate with age). 3

Perigynia beaks flattened and serrate, usually bidentate. 4

3. Scales usually covering perigynia, about the same width and length; heads brownish, in an elongate, flexible inflorescence; of moist upland sites. *C. praticola*

Scales conspicuously shorter and usually narrower than perigynia; heads more compact, darker; of depressional sites. *C. microptera*

4. Scales usually covering perigynia, about the same width and length; upland species. 5

Scales shorter and narrower than perigynia; plants of moist habitats. 6

5. Inflorescence flexible and elongate; of mesic sites. *C. aenea*

Inflorescence stiff and more aggregated; of subxeric sites. *C. xerantica*

6. Perigynia very narrow, the wing-margins narrow, to 4 mm. long. *C. crawfordii*

Perigynia broader, lanceolate-ovate. 7

7. Perigynia brownish when mature, 3-3.5 mm. long, ovate, not firm-thickened; absent from prairies. *C. bebbii*

Perigynia greenish, ovate-orbicular, 4-5.5 mm. long, firm-thickened, prairie species. *C. brevior*

Group 6

1. Lower sheaths shredded; culms not arising from old leaf tufts. *C. buxbaumii*

Culms arising from persistent leaf remains from previous year. 2

2. Pistillate scales to 2.5 mm. long, acute-obtuse, much shorter than perigynia; perigynia to 3.5 mm. long. *C. norvegica*

Pistillate scales longer than 2.5 mm., or acute, or both; perigynia mostly longer. 3

3. Perigynia not inflated, the heads (at least lower) nodding; widespread in wooded regions. *C. raymondii*

Perigynia rounded-inflated at maturity; heads mostly erect; mountain species. *C. atrosquama*

Group 7

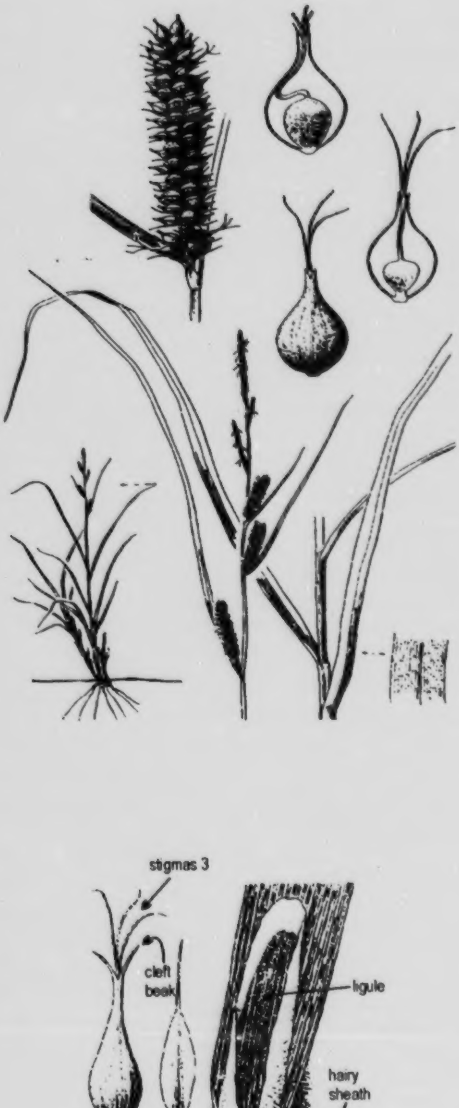
1. Culms all elongate, without short pistillate spikes hidden in basal sheaths; tufted grassland species. *C. pensylvanica*

At least some culms short, pistillate, hidden in basal sheaths; species of woodlands, open woods. *C. rossii*

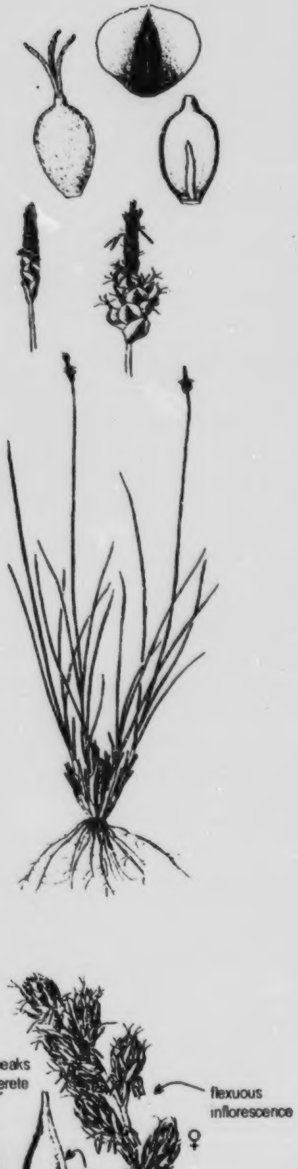
Group 8

1. Plants to 6 dm. tall, leaves firm, 1-4 dm. long; lowest bract shorter than inflorescence; perigynia often purple-suffused. *C. scopulorum*

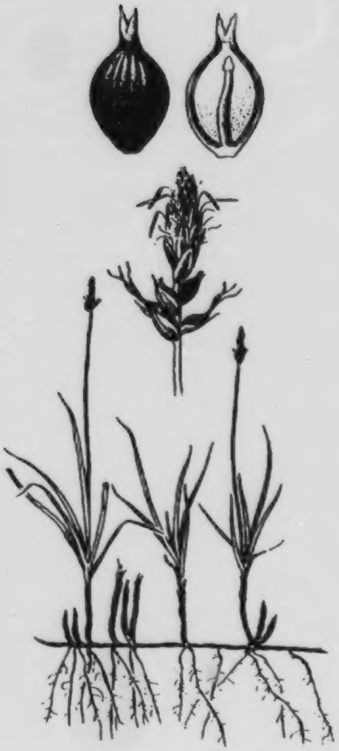
Plants to 8 dm. tall, leaves often longer; lowest bract exceeding inflorescence; perigynia often purple-dotted. *C. aquatilis*

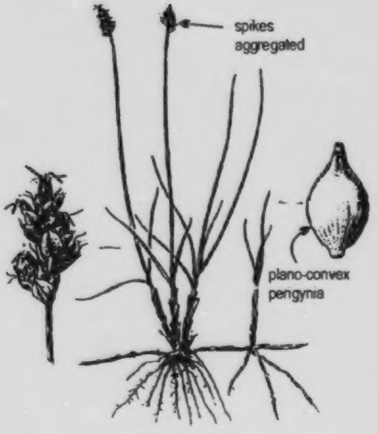

stigmas 3
cleft beak
ligule
hairy sheath

Carex atherodes

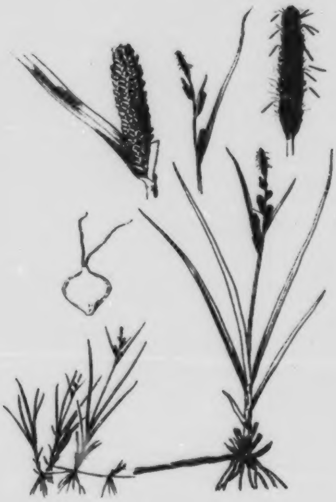

beaks terete
flexuous inflorescence
♀
wing margin
♂
gynaecandrous

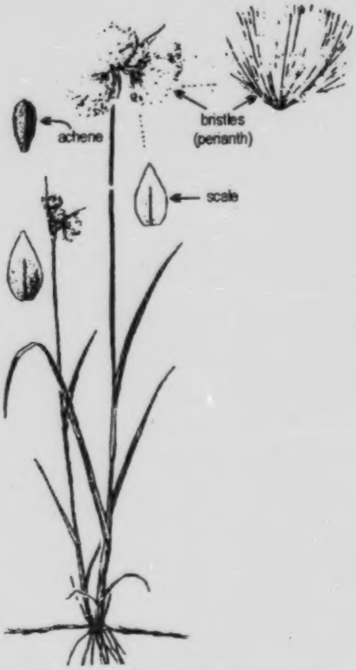
Carex praticola



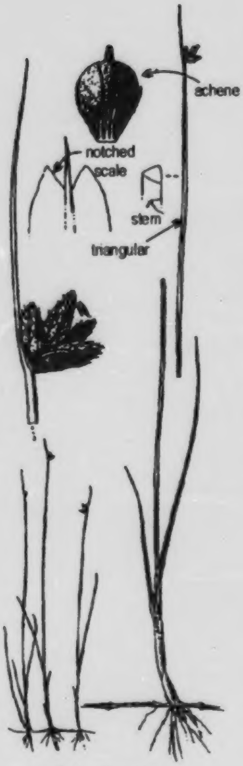

spikes aggregated
plano-convex perigynia

Carex stenophylla

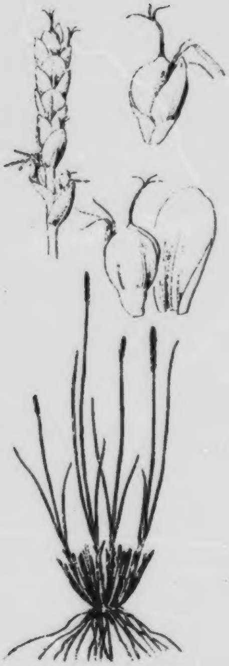



achene
bristles
(perianth)
scale

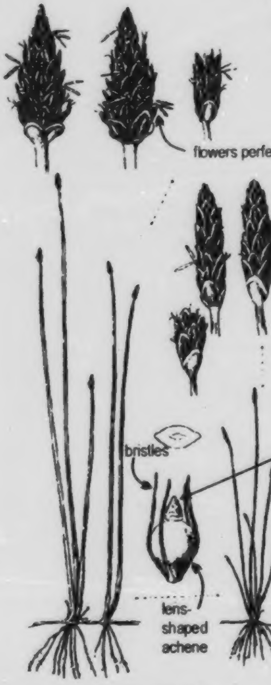
Eriophorum polystachion


achene
notched
scale
stem
triangular

Scirpus pungens



Kobresia myosuroides


flowers perfect
bristles
tubercle
lens-
shaped
achene

Eleocharis palustris

Carex aquatilis Wahlenb. ssp. ***altior*** (Rydb.) Hult. - Water Sedge

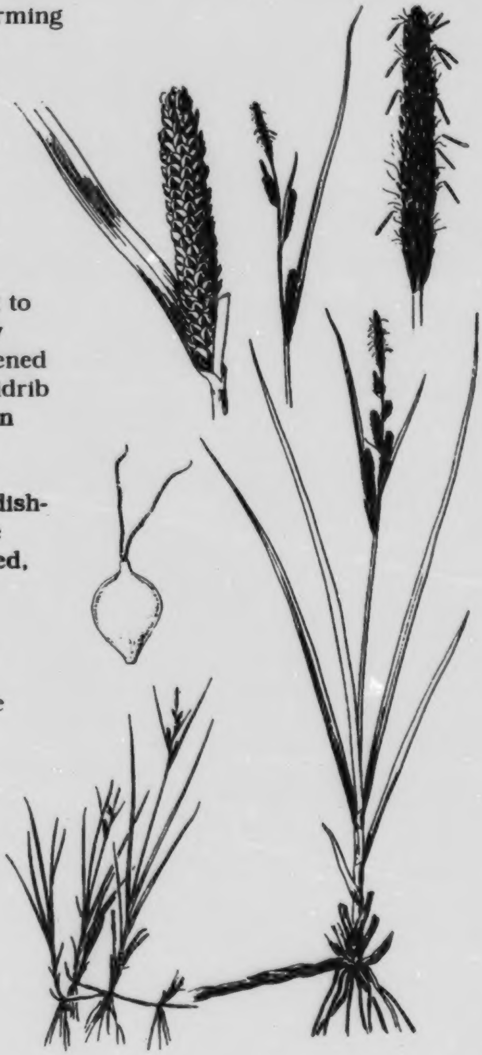
Growth Habit: **Densely tufted**, forming large clumps, **also sending out long, scaly rhizomes**; culms 2-8 dm. tall, **sharply triangular, roughened above on angles.**

Blades: **3-8 mm. wide**, flat to channeled, **usually blue-green**, roughened on margins and midrib below; **nodulose on lower part**.

Sheaths: Smooth, thin, **reddish-brown dotted, the lower distinctly red, nodulose**.

Ligules: Longer than wide.

Heads: Spikes stalked, the **upper 1-2 staminate**, these with purplish-brown scales; pistillate spikes **linear-oblong, 2-4**, the **upper sometimes staminate at top**; lowest bract exceeding inflorescence; pistillate **scales red-brown**, either shorter than or short-pointed and somewhat exceeding perigynia; **stigmas 2**, perigynia **flat,** oval-obovate, abruptly beaked at top, **often red-dotted, pitted, nerveless** except for 2 marginal nerves.



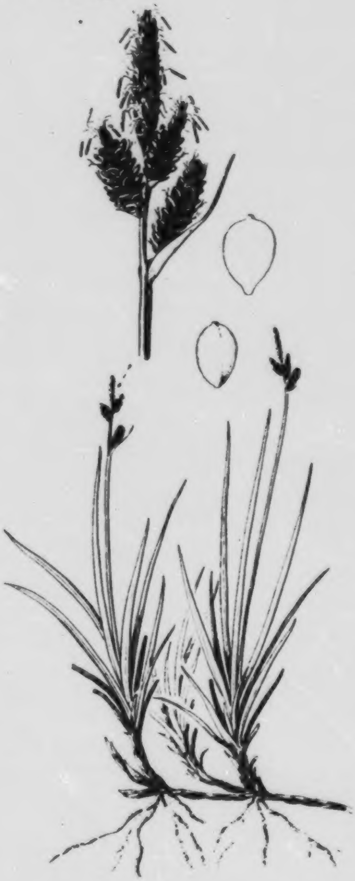
Similar Species:

1. ***Carex scopulorum*** Holm - Sedge

   Occasional, or sometimes locally abundant, in low meadows in the southwestern foothills/ montane region.

   Differs as follows:

   - Plants shorter, to 6 dm. tall.
   - Leaves firm, flat, with rolled margins, blue-green, to 6 mm. broad, and rather short, 1-3(4) dm. long.
   - Lowest bract shorter than inflorescence.
   - Perigynia green to copper, often purple-suffused.
   - Beak small, often distinctly bent.



Habitat & Distribution:

Very common and widely distributed.

A wetland species, growing on slough margins, on shores, in marshes and boggy areas, sometimes in shallow water. More likely than *C. rostrata* to be found in habitats where water movement is slow or minimal.

Forage Value:

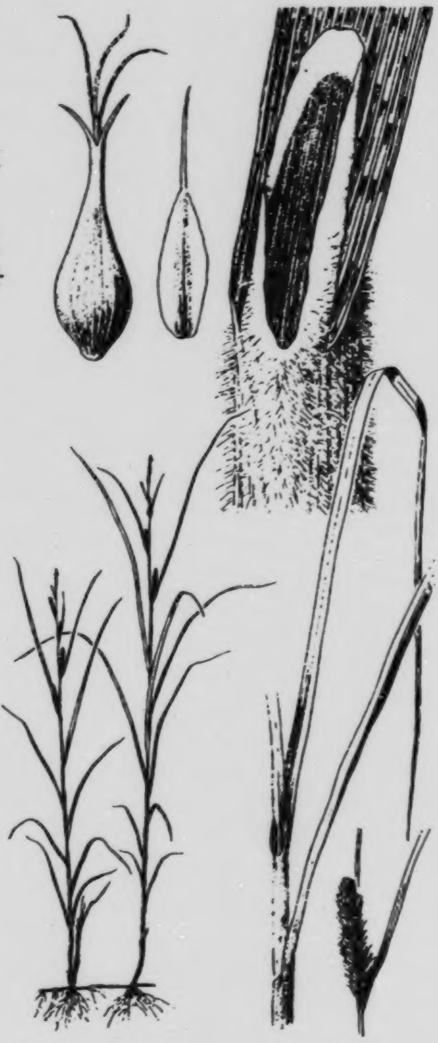
Good, although both nutritional value and palatability appear to vary from one region to the next, highest ratings recorded in Arctic regions where protein content is said to equal that of clover species; often abundant, the large leafy sedge furnishes a fair amount of forage and is often a component of native hay; it is considered valuable forage if upland grasses become dry and brittle. *Note: C. scopulorum* is also palatable, especially so to wild ungulates; the firm foliage remains green late into the season.

Grazing Response: A decreaser, also classed as an increaser #I, depending upon abundance of choice species and accessibility of wetlands; the vigorous rhizome system tolerates moderate grazing, but is not able to withstand continuous heavy use.

Notes: The specific name *aquatilis* refers to the aquatic habitat preference of the species; *C. aquatilis* is recommended for revegetation in moist places, the fast growing masses of rootstocks very effective in soil binding and erosion control; however, sedges are difficult to propagate except by rhizome sprigs, and little development of the genus as a whole has been undertaken.

Carex atherodes Spreng. - Awned Sedge

Growth Habit:	**Loosely tufted** plants with **long, slender horizontal rhizomes; culms 3-12 dm. tall, sharply triangular, mostly smooth, stout.**
Blades:	**3-12 mm. wide,** elongate, not clustered at base, firm, flat, long-pointed, hairless above, smooth, **coarse-hairy below, nodulose**; margins roughened.
Sheaths:	Sheaths **densely hairy, nodulose, basal ones reddish, disintegrating, becoming fibrillose**; brown-red-tinged and concave at top; aphyllopodic.
Ligules:	Conspicuous, longer than wide.
Heads:	**Upper 2-6 spikes staminate, 2-6 cm. long,** linear; **lower 2-4 spikes pistillate**, often short stalked, **5-12 cm. long**, the **upper sometimes staminate at top**; bracts leaflike; pistillate scales red-brown, with 3-nerved green centre, bristle-tipped and short hair-fringed; **stigmas 3, perigynia hairless**, thick and firm, green to light brown, **7-10 mm. long, many ribbed (12-20)**, tapering to a smooth **strongly cleft beak**; styles persistent, continuous with the 3-sided achene.



Habitat & Distribution:	Common and widely distributed. A wetland species, growing around sloughs, on shores, in marshes, wet meadows, often in standing water.
Forage Value:	Good, nutritional elements in good balance and protein content remaining relatively high; *C. atherodes* is a palatable species, especially relished during hot dry weather when upland grasses are less attractive; it makes good quality, high yielding native hay when wetlands are dry enough to permit early cutting; as with other wetland sedges, *C. atherodes* provides some habitat for wildlife, and is considered important food for waterfowl.
Grazing Response:	A decreaser, not tolerant of continued heavy use, especially vulnerable in dry years when stands are less vigorous, and livestock tend to graze wetlands more heavily.
Notes:	Sedges were sometimes used by native people, the roots of rhizomatous species such as *C. atherodes* used in basketry; as well, leaves were used to stuff mittens and boots as insulation during cold weather; as with water sedge, the strong rhizome system is very effective in binding loose wet soil.

Carex aurea Nutt. - Golden Sedge

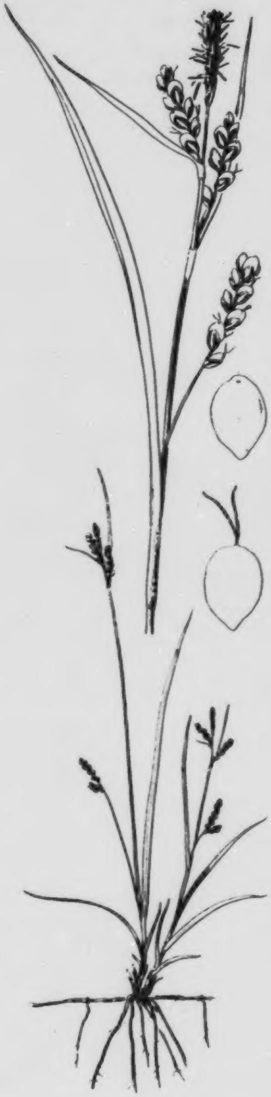
Growth Habit: Loosely caespitose plants from long, slender rhizomes; culms **slender, erect, to 1 dm. tall,** mostly phyllopodic, arising singly or a few together.

Blades: Leaves 2-4 mm. wide, 4-7 per culm, toward the base, flat but channeled toward base, acute.

Sheaths: Upper sheaths rather loose, pale-hyaline; lower sheaths **pale, faintly septate-nodulose**.

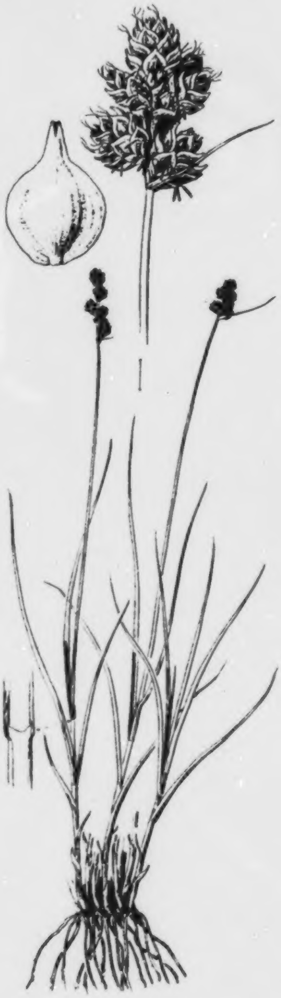
Ligules: About as long as wide.

Heads: Spikes 2-several, approximate or sometimes the lowest remote, **borne below or sometimes above leaves**; terminal spike-sessile/ subsessile, linear, 3-10 mm. long, staminate or with a few apical perigynia; lateral spikes 3-5, pisillate, the lower distinctly flower stalkd; bracts leaf-like, exceeding the inflorescence; pistillate scales broadly ovate, short short-pointed to blunt, widely spreading at maturity, shorter and narrower than perigynia, reddish-brown with a **conspicuous 3-nerved green centre** and white-hyaline margins; perigynia **orbicular-obovoid**, 2-3 mm. long, **coarsely ribbed**, rounded at the apex and **mostly beakless**; perigynia **fleshy at maturity, glaucous green to yellowish brown**, becoming white-pitted when dried; **stigmas 2**.



Habitat & Distribution:	Distributed throughout most Ecoregions. Absent from driest regions in the south. Grows in a variety of moist places; along streams, in wet meadows, in springy and boggy places, on moist banks.
Forage Value:	Poor, providing insignificant amounts of forage even when abundant.
Grazing Response:	An increaser, although not considered invasive.
Notes:	Syn. *C. garberi*; although of little importance as a range species, golden sedge nevertheless functions to provide cover in moist and boggy places, and, as the common name implies, is rather attractive as the heads turn golden-yellow at maturity.

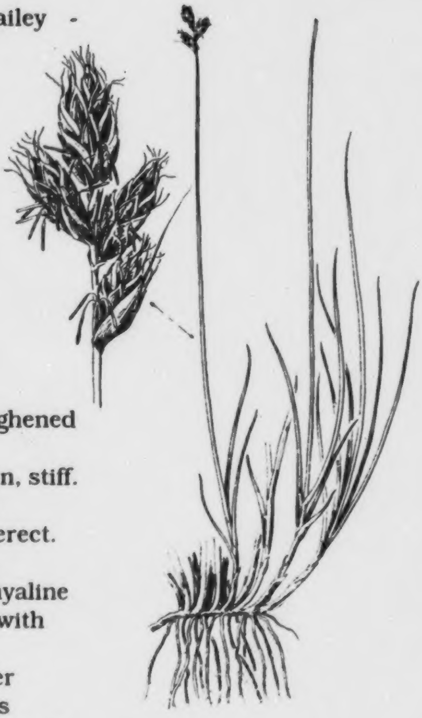
Carex brevior (Dewey) Mack. - Sedge

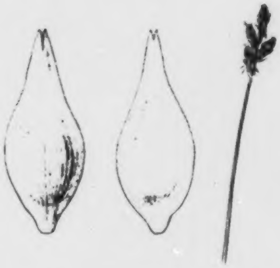


Growth Habit:	Densely tufted, without true rhizomes, but from short-prolonged **woody** rootstocks; **culms 3-10 dm. tall**, sharply triangular, **scabrous above**.
Blades:	2-4 mm. wide, much shorter than culms, crowded at base, distributed on lower 1/3 of culms; coarse, **firm**, scabrous on midrib below and on margins, **sometimes wrinkled when dry**.
Sheaths:	Glabrous, tight, hyaline ventrally. Basal ones aphyllopodic, **shredded-fibrillose**.
Heads:	**Spikes 3-10, pistillate flowers above staminate, usually well separated**, occasionally aggregated, **club-shaped at base**, greenish to tan; **bracts short**, the lowest sometimes prolonged; **pistillate scales shorter than perigynia**, yellow-brown with a green centre, margins narrowly hyaline, acuminate; perigynia **4.5-5 mm. long, ovate to subcircular, green, firm, strongly wing-margined, nerved dorsally, barely so ventrally**, abruptly contracted into a flat, **finely toothed cleft beak; stigmas 2**.

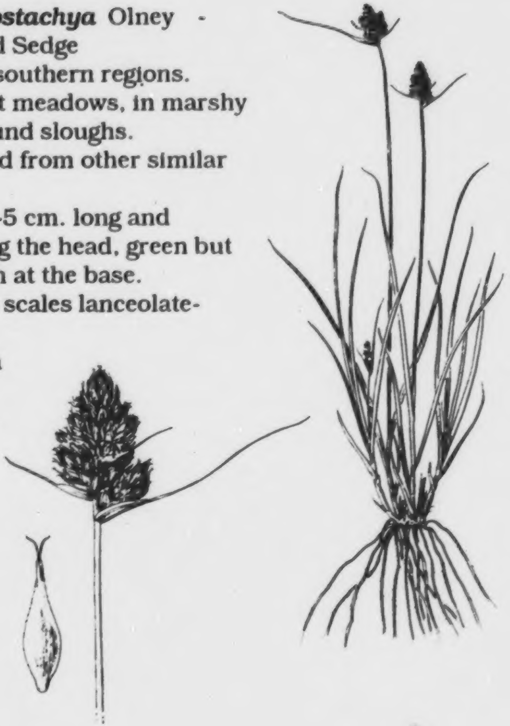
Similar Species:

1. ***Carex xerantica*** Bailey - White-scaled Sedge . Scattered populations, occurring throughout most regions. Found in open, dry woods, in dry prairie grassland. Differs as follows:
   - Culms erect, stiff and wiry, not strongly roughened above.
   - Blades pale green, stiff.
   - Heads rigid, the perigynia stiffly erect.
   - Scales covering perigynia, pale-hyaline and only tinged with red-brown.
   - Perigynia broader (ovate), nerveless ventrally, pale green to straw colored.

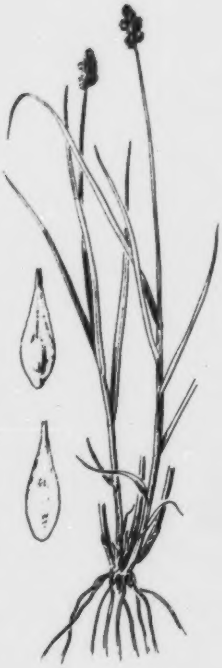


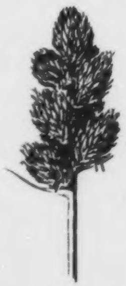


2. ***Carex athrostachya*** **Olney -**
Long-bracted Sedge
Frequent in southern regions. Grows in wet meadows, in marshy ground, around sloughs. Distinguished from other similar species:
- **Bracts 1-5 cm. long and exceeding the head, green but brownish at the base.**
- **Pistillate scales lanceolate-ovate.**
- **Perigynia nerved dorsally, often also ventrally.**

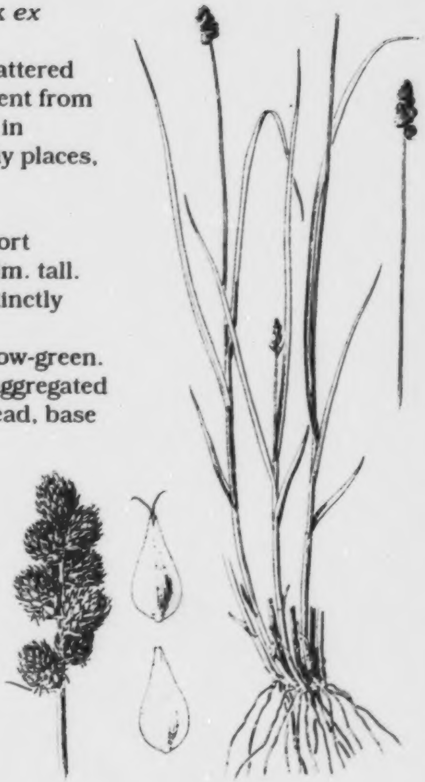


3. ***Carex crawfordii*** **Fern -**
Crawford's Sedge
Found in wet places, on shores in the boreal forest where fairly common. Similar to *C. brevior* in having perigynia beaks flattened and serrate to the tips.
Differs as follows:
- **Perigynia very narrow, about 1 mm. wide.**
- **Perigynia very narrowly winged, the wing nearly obsolete toward the base.**
- **Nerves evident on both sides of perigynia.**





4. ***Carex bebbii*** Olnex *ex* Fern. - Sedge
Frequent, rather scattered throughout but absent from the prairies. Found in swampy and marshy places, on shores.
Differs as follows:
    - Tufted, from short rhizomes, 2-8 dm. tall.
    - Plant bases distinctly fibrillose.
    - Leaves pale/yellow-green.
    - Spikes closely aggregated into an ovoid head, base of spikes truncate to rounded.
    - Scales brown with white centre.
    - Perigynia brownish, ovate, ascending, 3-3.5 mm. long and 1.5-2 mm. wide, nerved ventrally, often nerveless dorsally.



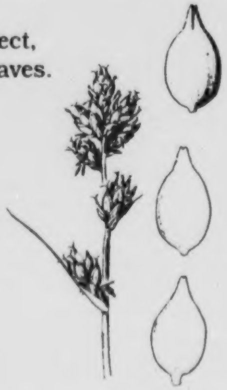
Habitat & Distribution: Common in prairie and parkland regions. Grows in open moist areas: depressional grassland, moist draws, around sloughs, on stream banks.

Forage Value: Fair, this and similar sedges palatable for most of the season but generally not plentiful enough to provide large amounts of forage; utilization will vary, depending primarily on abundance of choice forage.

Grazing Response: An increaser #1; populations usually retain reproductive capacity under normal grazing conditions, but will decline with continued heavy use.

Notes: *C. brevior* is valued in the prairie region for its soil binding properties, and although best adapted to depressional sites, will tolerate considerable seasonal drought.

Carex brunnescens (Pers.) Poir. - Brownish Sedge



Growth Habit: **Densely caespitose**, with short fibrillose rootstocks; **culms lax, slender**, mostly erect, 1-5 dm. tall, rough at apex, longer than leaves.

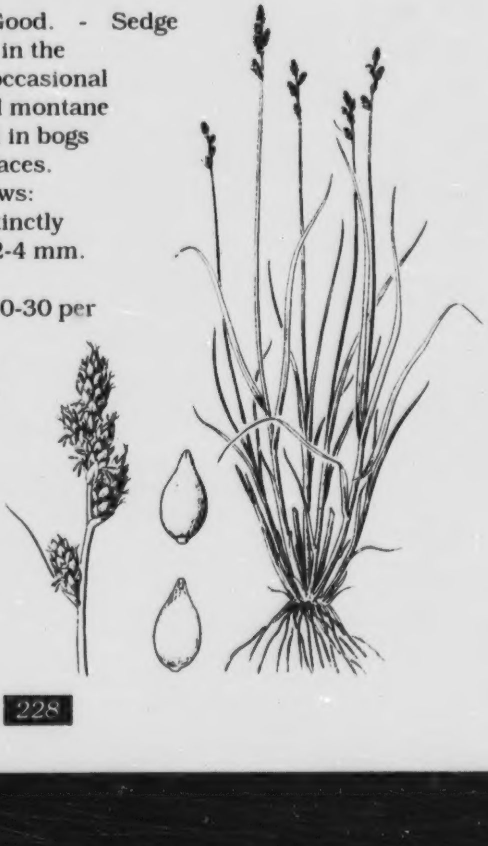
Blades: **1-2.5 mm. wide**, flat to channeled, **deep green, thin**, clustered near base; margins scabrous.

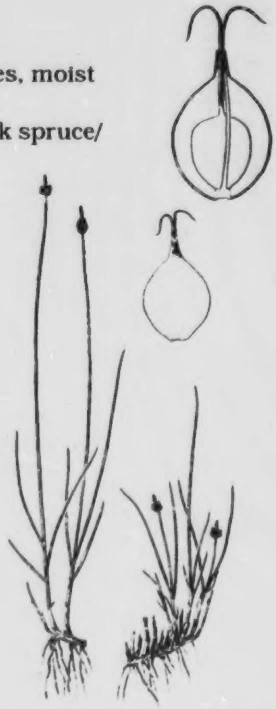
Sheaths: Tight, thin, hyaline ventrally.

Heads: **Spikes 5-10, gynaecandrous**, 4-8 mm. long, **the lowest often remote**, ovoid to subglobose; lowest bracts short, bristle-like; **scales ovate, mostly hyaline with green centers**, shorter than perigynia; perigynia flattened, **to 2.5 mm. long, 5-10 per spike, green to tan**, finely nerved on both surfaces, **pitted**, not wing-margined, **with distinct beaks, these serrate** and obliquely bidentate; **stigmas 2**.

Similar Species:

1. *Carex curta* Good. - Sedge
   Most common in the boreal forest, occasional in foothills and montane regions. Found in bogs and marshy places. Differs as follows:
   - Blades distinctly glaucous, 2-4 mm. wide.
   - Perigynia 10-30 per spike.
   - Perigynia beaks very short, barely visible.





Habitat & Distribution: Common in the boreal forest.
Found in wet meadows, bogs, marshes, moist woods, sometimes at high elevations.
Commonly associated with poor black spruce/sphagnum ecosites.

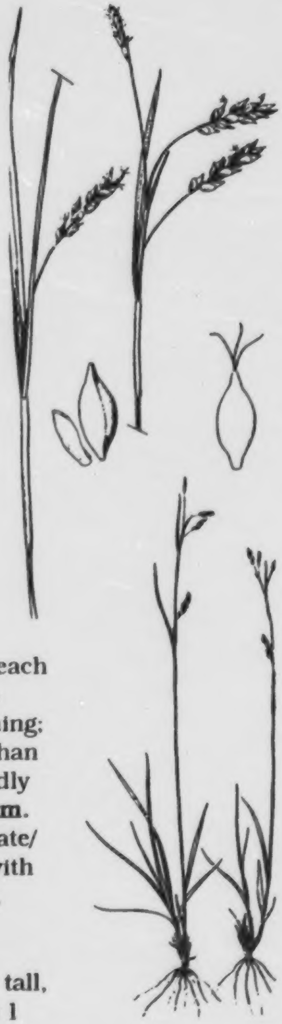
Forage Value: Fair (both *C. brunnescens* and *C. curta*); plants are generally considered to be moderately palatable, and when extensive populations occur, can be a significant source of forage if wetlands are accessible.

Grazing Response: Usually an increaser #1, this rating variable depending upon utilization potential of the specific site.

Notes: Both the above mentioned species are important soil building components of acid bogs and marshlands, and any efforts to re-establish them on these sites after disturbance should be encouraged.

Carex capillaris L. - Hair-like Sedge

Growth Habit: **Densely tufted**, with short rootstocks; culms **very slender**, 0.3-6 dm. tall, bluntly triangular, smooth, usually much exceeding leaves.



Blades: 0.5-2 mm. wide, up to 15 cm. long, flat or channeled basally, thin but firm, clustered at base of culm, old blades persistent; margins and lower midrib smooth to scabrous.

Sheaths: Tight, truncate at mouth, **basal ones dark brownish-purple, shredding**.

Ligules: Very short.

Heads: Terminal spike staminate, rarely pistillate flowers above staminate, 4-10 mm. long; lateral spikes 1-4, 0.5-1.5 cm. long, linear, pistillate, **on nodding, spreading peduncles**, each 5-25 flowered, **linear-oblong**; bracts usually exceeding culms, long-sheathing; pistillate scales ovate, thin, shorter than perigynia, brownish-tinged and broadly hyaline margined; perigynia **2-3.5 mm. long**, 3-angled, greenish-brown, serrate/ciliate, ribbed marginally, stipitate, with beaks 1 mm. long, **slightly notched**, oblique; **stigmas 3**.

Two subspecies locally:

1. Ssp. *capillaris*. Culms to 20 cm. tall, leaves to 2 mm. broad, spikes to 1 cm. long, pistillate spikes 3-18 flowered, perigynia 2-3 mm. long. More common in alpine habitats.
2. Ssp. *chlorostachys* (Steven.) L. L. & R. Culms 20-60 cm. tall, leaves to 4 mm. broad, spikes to over 1.5 cm. long, pistillate spikes to 20 flowered, perigynia 2.5-4 mm. long. More common at lower elevations.

Habitat & Distribution: Rather common, widespread, absent from the prairies and most of the parkland region.

Found on shores, in wet woods (springs or swampy areas), boggy places, in wet meadows, often associated with moist, rich willow thickets.

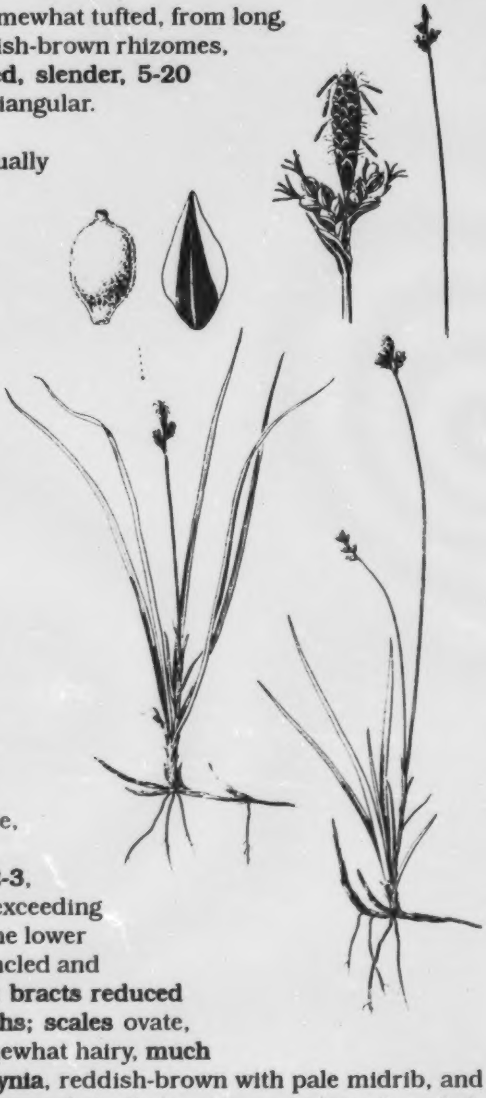
Forage Value: Poor, plants are small and unproductive and provide insignificant grazing even when occurring in dense stands.

Grazing Response: An increaser #1, this and other moderately competitive species declining when overall range conditions begins to deteriorate.

Notes: Both the specific and common names refer to the fine, hair-like inflorescence; the presence of *C. capillaris* is usually an indication of a well-balanced vegetation diversity, the specific composition of associated species varying in response to the rather wide range of habitat adaptations of the species.

Carex concinna R. Br. - Beautiful Sedge

Growth Habit:	Plants single or somewhat tufted, from long, slender scaly reddish-brown rhizomes, **culms often curved, slender, 5-20 cm. tall**, bluntly triangular.
Blades:	**1-3 mm. wide**, usually somewhat shorter than culms, **flat, recurved-spreading, soft, clustered near the base, old leaves often persistent**.
Sheaths:	Tight, hyaline ventrally; **lower shredded, red-purple tinged**, especially on sterile shoots.
Ligules:	Nearly as long as wide.
Heads:	Inflorescence compact, 1-3 cm. long; **staminate spike** nearly sessile, **3-6 mm. long, pistillate spikes 2-3**, upper sometimes exceeding staminate spike, the lower sometimes penduncled and somewhat remote; **bracts reduced to bladeless sheaths; scales** ovate, blunt at apex, somewhat hairy, **much shorter than perigynia**, reddish-brown with pale midrib, and margins hyaline, **somewhat ciliate-erose**; perigynia 3-angled, to 3 mm. long, greenish, **nerved but these obscured by dense pubescence**; beak short, oblique; **stigmas 3, dark, very short**.



Similar Species:

1. ***Carex richardsonii*** R. Br. - Richardson's Sedge
Rather scattered throughout, generally less common than *C. concinna*. Found in dry, open woods, in sandy or rocky places. Often on calcareous soil.
Differs as follows:
    - Plants somewhat taller, to 3 dm.; culms scabrous.
    - Blades similar (flat, rather conspicuous, mostly basal, old blades evident) but differing: stiffer and distinctly scabrous above and on margins.
    - Staminate spike longer, 10-25 mm. long, distinctly flower stalkd.
    - Pistillate scales slightly exceeding perigynia, acutish, not hair-fringed (stigmas 3).
    - Pistillate spikes with more numerous (10-25) flowers.

Habitat & Distribution:

Common in wooded areas. Absent from the prairie and parkland regions.
Found in moist woods, on stream banks, on rich peaty, often calcareous soil, a primary species in many mature forests.

Forage Value:

Poor to fair, producing insufficient amounts of herbage to be considered of value as a range species.

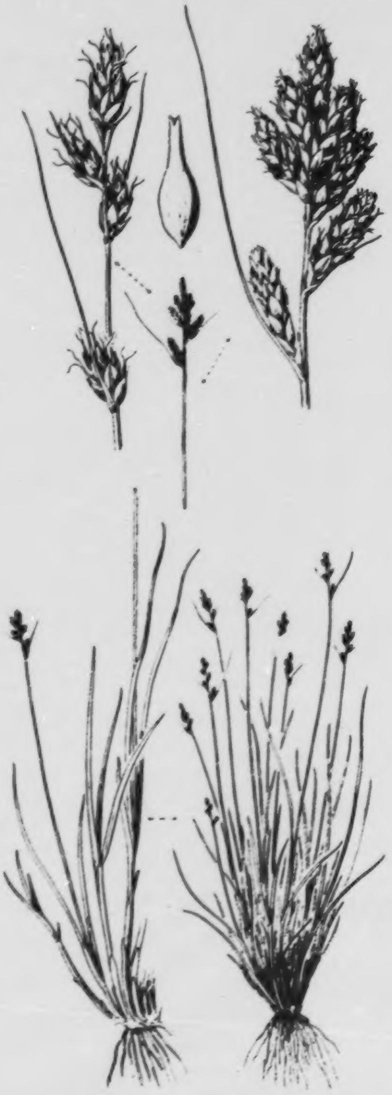
Grazing Response:

An increaser in wooded areas, but decreases in clearings until the re-establishment of the tree canopy.

Notes:

As the specific and common names imply, *C. concinna* is frequently encountered as one of several attractive understory species, an important (although usually a minor) component of woodlands where both species diversity and graminoid ground cover is normally rather low.

Carex deweyana Schwein. - Dewey's Sedge



Growth Habit:	**Caespitose plants** from short rootstocks; culms 2-8 dm. tall, **very lax and spreading**, rough beneath the head.
Blades:	Blades shorter than culms, **flat, soft, thin, grass-like, glaucous to pale yellow-green**, 2.5 mm. wide, slightly scabrous on margins.
Sheaths:	Tight, the lower pale green to tawny.
Heads:	Spikes 2-6, the upper approximate, **the lower widely separate, in a flexuose head** 2-6 cm. long; **bracts slender, the lowest elongate** but rarely exceeding heads; **terminal spike gynaecandrous, the lateral pistillate**; scales ovate-oblong, blunt to short-awned, **pale-hyaline with greenish centres**, slightly shorter than perigynia; perigynia oblong-lanceolate, with a serrate, weakly bidentate **beak about ½ the length of the body**; perigynia 4-5 mm. long, **pale green**, nerveless ventrally, obscurely nerved dorsally, **distinctly spongy at the base, with sharp but not winged margins, appressed, not spreading; stigmas 2.**

Habitat & Distribution: Found throughout most Ecoregions, absent from prairie and parkland regions.
A species of rich, moist, often open woods, borders of woodlands, sometimes on shaded stream banks.

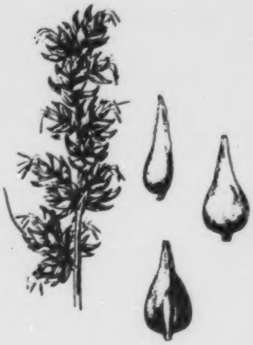
Forage Value: Fair, moderately palatable but at best only marginally productive; occurrences of the species are usually rather sporadic, and actual quantities of herbage produced are small.

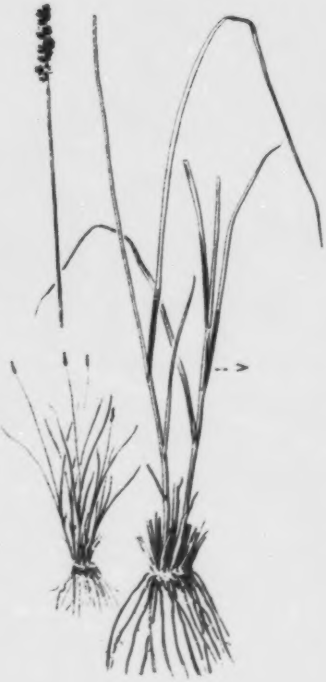
Grazing Response: An increaser #1 .

Notes: *C. deweyana* is often overlooked due to its grass-like leaves and rather inconspicuous greenish inflorescence; it is, nevertheless, a fairly common component of many woodlands where vigorous populations represent a healthy ecosite.

Carex diandra Schrank - Two-stamend Sedge

Growth Habit:	Plants forming large clumps, from short fibrillose rhizomes; culms **densely caespitose**, 3-7 dm. tall, exceeding the leaves, sharply triangular and roughened on the angles, stiff but slender.
Blades:	Leaves 1-2.5 mm. wide, folded, scabrous on margins and midrib below, light green.
Sheaths:	Conspicuously ridged, thin, tight, **glandular and speckled with red ventrally, not copper-tinged at the summit, nodulose below, phyllopodic**.
Ligules:	Very short.
Heads:	Spikes **numerous, androgynous, densely aggregated** into a **dark brown** stiff, somewhat compound head **1-5 cm. long**; staminate flowers inconspicuous; bracts inconspicuous to rudimentary, to 1 cm. long; scales wider than but mostly shorter than mature perigynia, brown with a pale midrib and hyaline margins, acute to sharp-pointed; perigynia soon **spreading-divergent**, ovate, strongly convex ventrally, **2-2.7 mm. long, dark brown and glossy at maturity**, nerved dorsally and at the base ventrally, with a long strongly serrate greenish or whitish beak; **stigmas 2**.





Similar Species:

1. *Carex prairea* Dewey - Prairie Sedge
Found in similar habitats, but less common, and more often restricted to the boreal forest.
Differs as follows:
   - Leaf sheaths strongly bronze-tinged at the mouth.
   - Sheaths also glandular, the red dots raised.
   - Plants aphyllopodic, the lower bladeless sheaths conspicuous.
   - Heads larger, 3-8 cm. long, more open and flexuose, pale brown.
   - Scales paler brown (with pale midvein and margins, about as long as perigynia).
   - Perigynia larger (2.5-3.5 mm. long), not convex ventrally, straw-colored and pale at the apex, only slightly lustrous.
   - Perigynia not spreading at maturity.

Habitat & Distribution:

Found in all regions except the prairies.
Grows in swamps and wet meadows, especially common in peaty marshes and graminoid dominated fens and bogs.

Forage Value:

Poor to fair (both *C. diandra* and *C. prairea*), probably palatable but generally underrated due to the inaccessibility of the bogs and marshes they occupy; as with most productive bog species, utilization can be high in dry conditions that improve access, also after freeze-up when snowfall accumulations are not phohibitive.

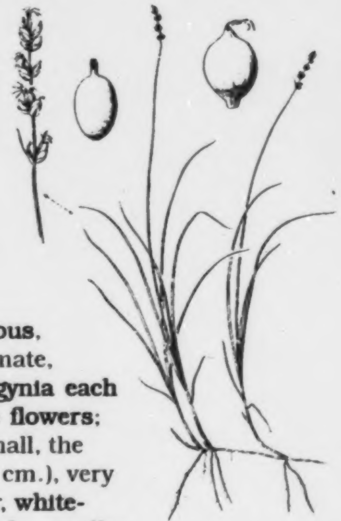
Grazing Response:

Increasers.

Notes:

The *Carex diandra/prairea* complex represents a group of bog species that have significant biomass and cover values; over time, the build-up of both matted root material and decayed herbage as well as accumulations of peat moss are responsible for the development of organic soils typically found in bogs.

Carex disperma Dewey - Two-seeded Sedge



Growth Habit: **Loosely tufted, from long slender rhizomes; culms very slender, weak, usually nodding**, exceeding leaves, 1-6 dm. long, scabrous.

Blades: Leaves borne on lower stem, **thin, flat, 1-2 mm. wide**; old leaves usually persistent, **pale green**.

Heads: **Spikes 2-5, sessile, androgynous**, scattered or the upper approximate, **small and with few (1-6) perigynia each and only 1-2 apical staminate flowers**; bracts sheathless, the upper small, the lower sometimes elongate (to 2 cm.), very slender; scales ovate-triangular, **white-hyaline and with a green midrib**, smaller than perigynia; **perigynia plump**, unequally biconvex, **elliptic-ovoid, 2-2.8 mm. long, pale to yellow green, finely nerved on both surfaces, white-pitted**, short-stipitate and abruptly contracted to a minute, entire beak; **stigmas 2**.

Habitat & Distribution: Frequent in most regions. Absent from the prairies. Found at low to moderate elevations.
Grows in boggy and swampy woods, in wet meadows and marshes.

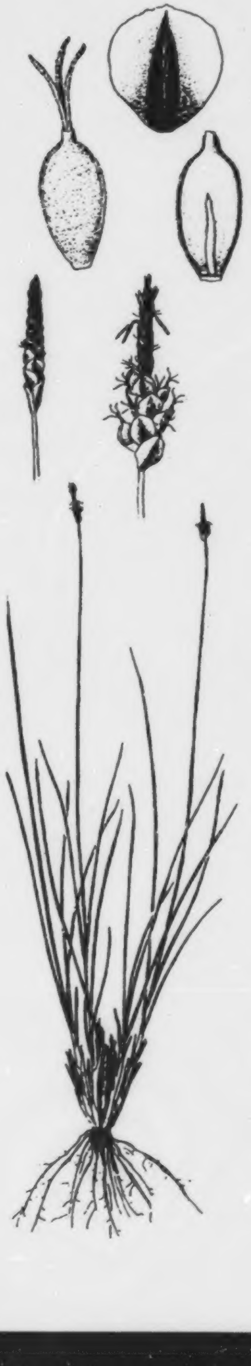
Forage Value: Poor, producing little forage and this is usually below normal grazing level.

Grazing Response: An increaser but not invasive.

Notes: The specific name, a reference to the few seeds characteristically produced; inconspicuous by virtue of its size, *C. disperma* is often overlooked and is seldom abundant; however, as with other common but minor species, it does play a role in contributing to the diversity of our extensive bog and wetland ecosystems; collectively, it is the various combinations of these seemingly insignificant components that form major communities in western and northern regions.

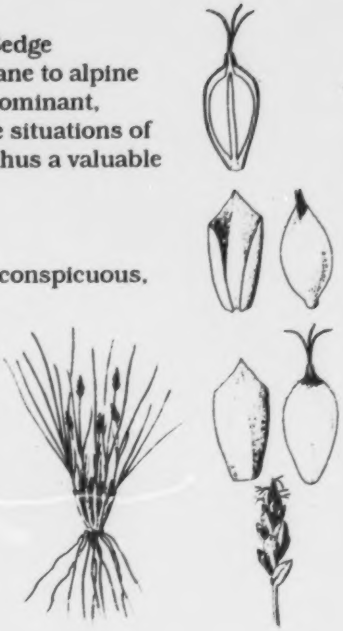
Carex filifolia Nutt. - Thread-leaved Sedge

Growth Habit:	**Very densely tufted**, and **often forming large clumps**, rootstocks short, thick; culms **very slender, wiry, 1-3 dm. tall**, smooth.
Blades:	About **0.5 mm. wide, very slender**, nearly as long as culms, **stiff, inrolled**, margins often roughened, clustered near base.
Sheaths:	Truncate at mouth; **old basal sheaths persistent, stiff, very conspicuous, reddish-brown, shredding**.
Ligules:	Wider than long.
Heads:	Spike **solitary, staminate flowers above pistillate**, 1-3 cm. long, linear, or broader at base; **bract lacking**; scales **broad**, blunt, **with broad pale margins**, mostly larger than perigynia; perigynia 3-4 mm. long, egg-shaped-circular, 2-ribbed, **hairy**, at least above, abruptly narrowed to small, stout, truncate beak; **stigmas 3**.

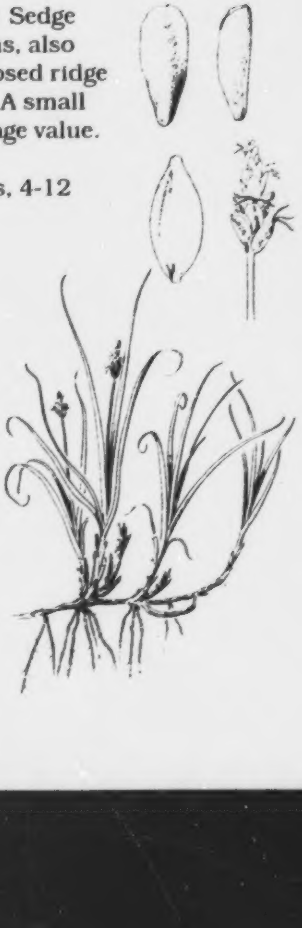


Similar Species:

1. ***Carex nardina*** **Fries - Sedge**
   Common in open dry montane to alpine sites, in some meadows a dominant, climax species, and in these situations of considerable biomass and thus a valuable forage plant.
   Distinguished as follows:
   - **Plants in dense tufts.**
   - **Old sheaths persistent, conspicuous, red-brown.**
   - **Culms 3-10 cm. tall, slender.**
   - **Leaves filiform.**
   - **Spikes solitary, ovoid, 5-10 mm. long, androgynous.**
   - **Pistillate scales ovate, obtuse, dark brown.**
   - **Perigynia striate, stalked, 3-3.5 mm. long, with a short beak.**



2. ***Carex rupestris*** **All. - Curly Sedge**
   Frequent in dry alpine situations, also commonly encountered on exposed ridge tops in foothills/montane sites. A small species, of rather negligible forage value.
   Distinguished as follows:
   - **Plants tufted from rhizomes, 4-12 cm. tall.**
   - **Culms firm.**
   - **Leaves thick, 1-3 mm. wide, flat, early withering/curling at tips, persistent at plant bases.**
   - **Spikes androgynous, solitary, in an oblong head.**
   - **Scales brown with light centres and hyaline margins, mostly covering the perigynia.**
   - **Perigynia 4 mm. long, oblong, glossy, brownish, finely nerved.**
   - **Stigmas 3.**



3. ***Kobresia myosuroides*** (Vill.) Fiori & Paol. - Kobresia
A species of open montane to alpine grasslands, at times prominent along with grasses such as hairy wild rye and rough fescue. In some areas providing considerable amounts of forage but often only marginally palatable.
Distinguished as follows:

- Forming large, dense tufts with old sheaths prominent, brown-shredded.
- Leaves very narrow, erect.
- Culms to 3 dm. tall, with linear, undivided spikes, these with unisexual flowers.
- Upper spikelets staminate, the lower androgynous.
- Glumes (perigynium) brownish, glossy, with free margins.
- Achenes 2.5 mm. long, brownish, mostly beakless.

Note: Illustration on page 216.

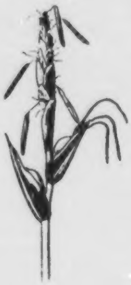
Habitat & Distribution: Common in southern regions. Most prevalent in the prairies, also in parkland areas and sometimes on exposed sites at high elevations.
Grows in dry grassland, sandy prairie, on eroded slopes. An indicator of dry short grass and mixed grass ecosites.

Forage Value: Good, the plants nutritious, and as with most sedge species, having some curing properties; protein and phosphorus contents are equal to or higher than those of many grasses, and crude fiber ratings are low; a palatable species, especially to sheep, although actual yields are relatively low except where high cover values occur.

Grazing Response: An increaser, the tough root system extremely resistant to heavy grazing, and plants show excellent drought resistance and often thrive when associated vegetation is adversely affected by long, hot dry spells.

Notes: The name *filifolia* refers to the characteristic fine, thread-like leaves; also known as niggerwool, hair sedge, short hair sedge; *C. filifolia* is very effective in erosion control on both sandy flats and on exposed hillsides, the mass of tough roots very persistent and often remaining intact when plants die; however, as with most sedges, it is a difficult species to propagate, and may never be available commercially.

Carex geyeri Boott - Elk Sedge

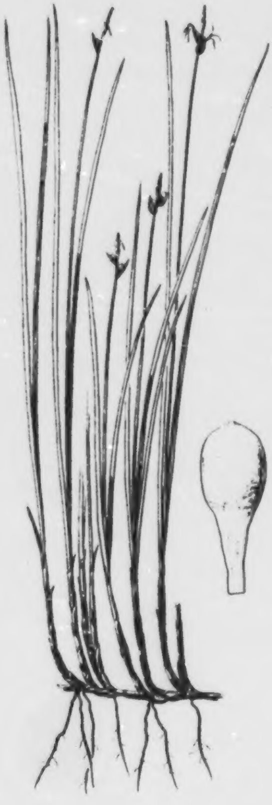


Growth Habit: **Loosely to densely tufted plants from thick, woody, scaly rhizomes; culms stiff, rough, 1-4 dm. tall.**

Blades: **Leaves numerous, rough on margins, leathery**, flat to channeled, **the tips typically withering; culm blades short**.

Sheaths: Tight, truncate at the mouth, aphyllopodic.

Ligules: Very short.



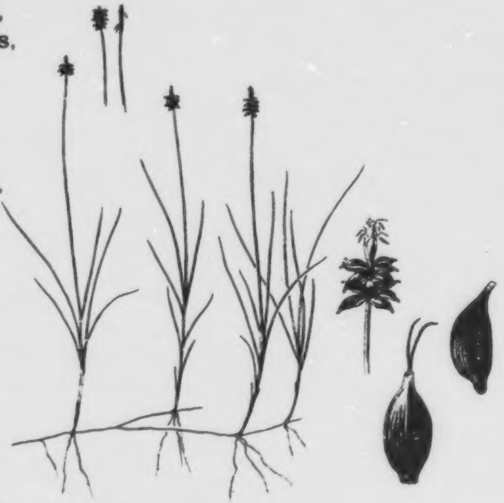
Inflorescence: **Spikes solitary, rather few, androgynous**, without bracts, staminate portion linear, short-stalked above the **1-3 perigynia**; pistillate scales larger than perigynia, green-brownish with pale margins; perigynia obovoid, 5.5-7mm. long, **triangular, glabrous, green to tawny, with 2 ribs, otherwise neverless, minutely beaked; stigmas 3**.

Habitat & Distribution: Frequent (often considered locally abundant rather than widely distributed) on open mountain slopes, in dry woods. Confined to the southern Rocky Mountains.

Forage Value: Fair, considered moderately palatable early in the season when foliage is succulent, and again in the dormant season primarily because the leaves tend to remain green longer than many associated species; wildlife use is considerable both in the spring and again in the fall, domestic livestock generally avoid the plants until late season; the importance of elk sedge as a range species is based partially on the fact that it is often prominent, at times comprising over 50 percent of available forage.

Grazing Response:	An increaser where best adapted, the tough woody root systems tolerate heavy trampling as well as relatively dry conditions.
Notes:	Due to both its frequent abundance and tough woody root system *C. geyeri* has exceptional soil binding properties, and rates among our more valuable watershed protection species, typically occurring on loose, shallow soils and steep slopes that are especially prone to erosion.

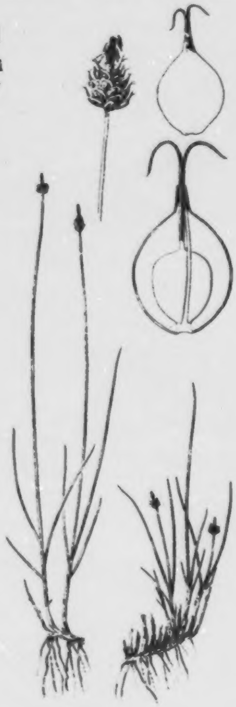
Carex gynocrates Wormsk. - Northern Bog Sedge



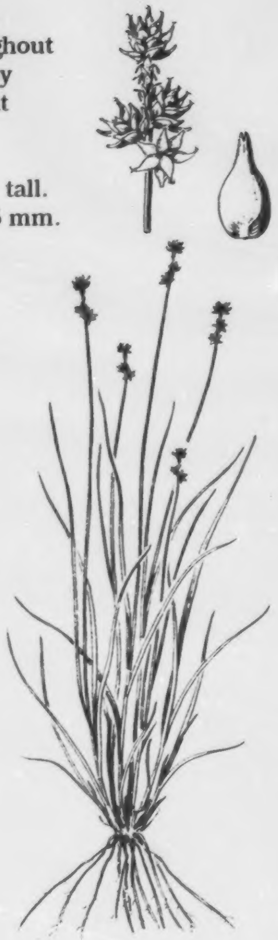
Growth Habit:	**Plants with long, slender rhizomes**, also apparently stoloniferous, culms arising singly or a few together, **filiform**, smooth, almost rounded, **2-30 cm. tall**.
Blades:	**To 0.5 mm. wide, filiform, rolled, stiff**, clustered near the base.
Sheaths:	Very tight, veiny, the lower tawny-brownish, shredding with age.
Ligules:	Much wider than long.
Heads:	**Spikes solitary, usually entirely pistillate or staminate**, occasionally androgynous, **5-15 mm. long**; pistillate scales shorter than perigynia, broad, **reddish-brown**, margins and midrib hyaline; **perigynia 2.5-4 mm. long, 4-10 per spike, spreading to reflexed with age, glabrous, glossy, yellowish brown-black**, firm, **finely nerved dorsally, obsurely so ventrally**, abruptly narrowed to a finely serrate beak 0.5 mm. long; **stigmas 2**.

Other Species:

1. ***Carex chordorrhiza*** L.f. - Sedge
   Most common in the boreal forest, a frequent component and indicator of sphagnum bogs.
   Distinguishing characteristics:
   - Culms elongating and reclining, producing new culms from axils of leaf tufts.
   - Fertile culms slender, 1-3 dm. tall, with leaves 1-5 cm. long.
   - Leaves on sterile culms longer.
   - Heads crowded, 5-15 mm. long, androgynous.
   - Pistillate scales rounded, long-pointed, brown.
   - Perigynia 2-3.5 mm. long, firm, nerved, short-beaked.
2. ***Carex capitata*** L. - Sedge
   Locally abundant in southern boreal and lower foothills regions. Found in calcareous bogs, and an indicator of these habitats.
   Distinguishing characteristics:
   - Loosely tufted plants with short rhizomes.
   - Plants red at base.
   - Culms 1-3 dm. tall, fine but wiry.
   - Leaves filiform.
   - Spikes solitary, 5-10 mm. long, ovoid, androgynous.
   - Pistillate scales distinctly rounded-ovate, obtuse, margins hyaline.
   - Perigynia spreading, longer than scales, smooth, with sharp margins, beak 0.5-0.9 mm. long.



3. ***Carex interior*** Bailey - Sedge
Rather common, scattered throughout wooded regions. Found in swampy places, in bogs, often in somewhat calcareous habitats.
Distinguished as follows:
- Slender tufted plants 2-5 dm. tall.
- Leaves clustered below, to 2.5 mm. wide.
- Spikes gynaecandrous or lateral pistillate, 3-6, sessile, small, clustered but not densely so.
- Terminal spike usually with conspicuous elongated staminate base.
- Scales short, mostly hyaline with green midvein.
- Perigynia widespreading at maturity, glossy-tan, nerved at least dorsally.
- Perigynia oblong-ovoid, to 3 mm. long, with thick margins and abruptly narrowed to a bidentate beak to 1 mm. long.
- Stigmas 2.



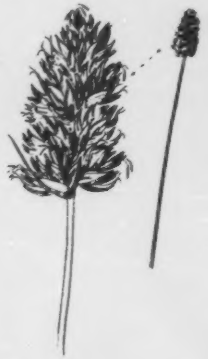
Habitat & Distribution: Common, found in all regions except the dry prairie and parkland Ecoregions.
Grows in bogs, marshes, muskegs, swampy woods. Especially common in sphagnum bogs and is an indicator of these ecosites.

Forage Value: Poor; from a grazing perspective, a diminutive species providing little forage, also often inaccessible due to habitiat.

Grazing Response: An increaser.

Notes: All mentioned species can usually be linked with specific ecosites, *C. capitata* an indicator of calcareous bogs, *C. gynocrates* and *C. chordorrhiza* associated with sphagnum.

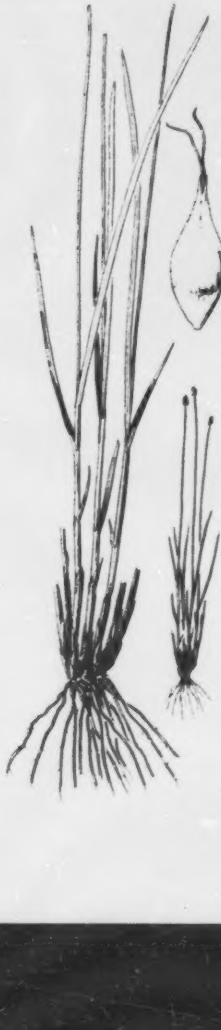
Carex hoodii Boott - Hood's Sedge



Growth Habit: **Very densely caespitose**, from very short, stout, black, fibrillose rootstocks; **culms 2-8 dm. tall**, rather slender, **sharply triangular and roughened above on the angles**.

Blades: Leaves flat to channeled, 1.5-3.5 mm. wide, elongate but shorter than culms, borne near stem base, scabrous on margins, less so above and below.

Sheaths: Tight, very thin ventrally, hyaline-margined; **lower sheaths brown-blackish**; plants distinctly aphyllopodic.



Heads: Spikes 4-8, **androgynous, 1-2 cm. long, in a dense stiff ovoid-circular head 1-2 cm. long**, the lower spikes seldom separated; bracts sheathless, **absent or sometimes a rudimentary one at the base of the head**; staminate flowers few, the pistillate scales ovate-triangular, about the size of and mostly concealing perigynia, **acute to acuminate-short short-pointed, lusterous, chestnut brown with a green midrib and hyaline margins; perigynia ovate-elliptic, 3.5-5 mm. long, with a bidentate serrate beak** about 1 mm. long; perigynia flat-concave and nerveless ventrally, convex and nerved dorsally, **glossy brown with green margins at maturity; stigmas 2**.

Habitat & Distribution: Restricted to western regions, locally abundant in foothills and montane areas.

Found in grasslands and meadows, on open slopes and in open woods, specifically associated with relatively rich, moist sites.

Forage Value: Fair; supplying relatively large amounts of forage when strong poulations occur; plants are moderately palatable to livestock and rate fairly high for game, particularly so for elk; increases in utilization can be at least partially correlated to the species' frequent association with primary rangeland.

Grazing Response: A decreaser; as a grassland species, *C. hoodii* is susceptible to overgrazing, and populations typically diminish in heavily utilized areas.

Notes: Hood's sedge is one of several large, bunch-type sedges known to produce rather extensive root systems that are effective in binding soil and preventing erosion.

Carex lanuginosa Michx. - Woolly Sedge

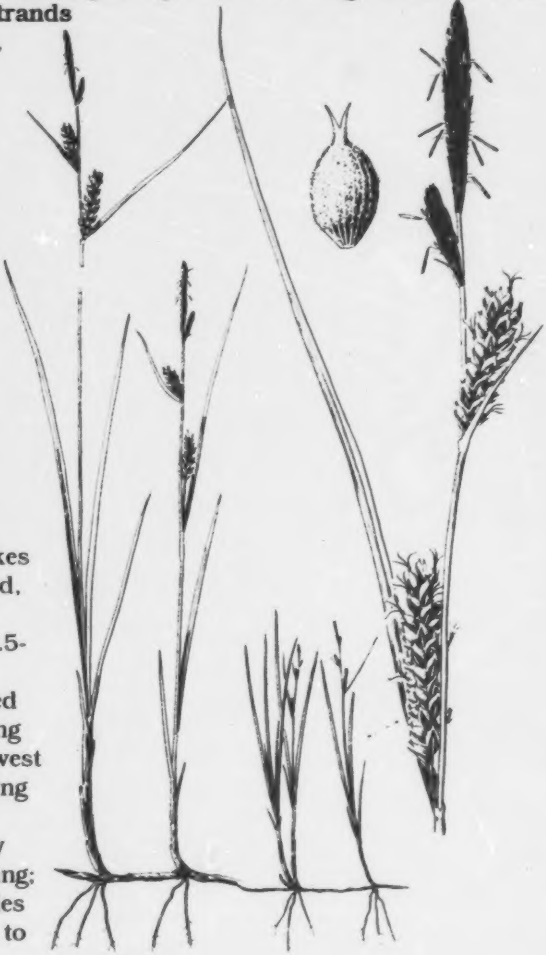
Growth Habit: Caespitose and also forming **long, tough, scaly rhizomes**; culms arising singly or several together, 3-7 dm. tall, sharply triangular, rough above, stiff, erect.

Blades: **2-5 mm. wide**, elongate, often as long as culms, long-pointed, few per culm (2-5), flat, with rolled margins, dull green, scabrous on margins and on midrib below, **septate-nodulose**.

Sheaths: **Reddish tinged** and deeply concave at mouth; lower sheaths **red-purple, disintegrating and becoming fibrillose with horizontal strands** ("laddering"), glabrous, weakly to strongly **septate-nodulose**; strongly aphyllopodic.

Ligules: About as long as wide.

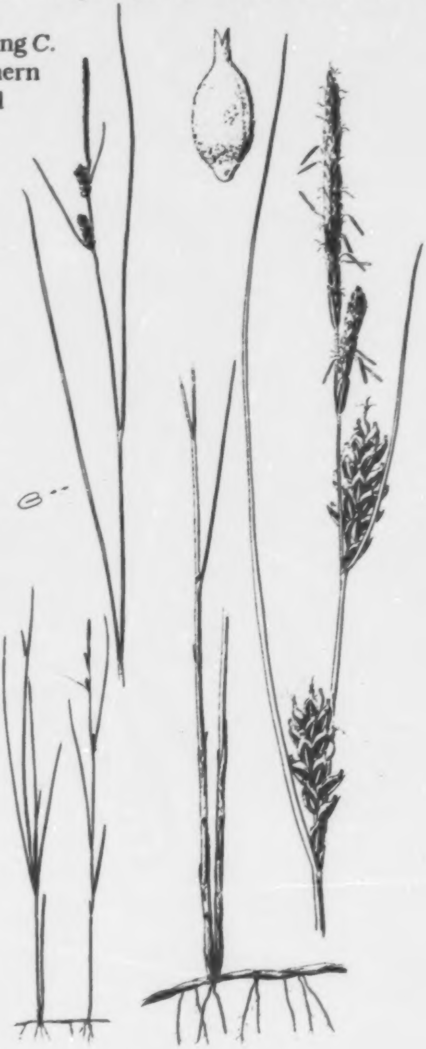
Heads: Terminal 1-2 spikes staminate, long-flower stalkd; pistillate spikes 2-3, separated, erect, subsessile, 1.5-5 cm. long, many flowered with ascending perigynia; lowest bract exceeding head, upper reduced, very short sheathing; pistillate scales from shorter to



slightly longer than perigynia, reddish-brown with green, 3-nerved centers, long-acuminiate to short awned; hair-fringed; perigynia **2.5-3.5 mm. long**, firm, somewhat inflated, greenish-brown, **densely pubescent, this obscuring the many nerves**; beaks short (1 mm.) but **deeply cleft; stigmas 3**.

Similar Species:

1. ***Carex laisocarpa*** Ehrh. ssp. ***americana*** D. Love & B. - Hairy-fruited Sedge
   Very similar, replacing *C. lanuginosa* in northern regions where found in swamps and bogs.
   Differs as follows:
   - Blades very slender-rolled, smooth, or somewhat scabrous on margins and lower midvein, to 2 mm. wide.
   - Culms not as sharply angled, smooth or scabrous at apex.

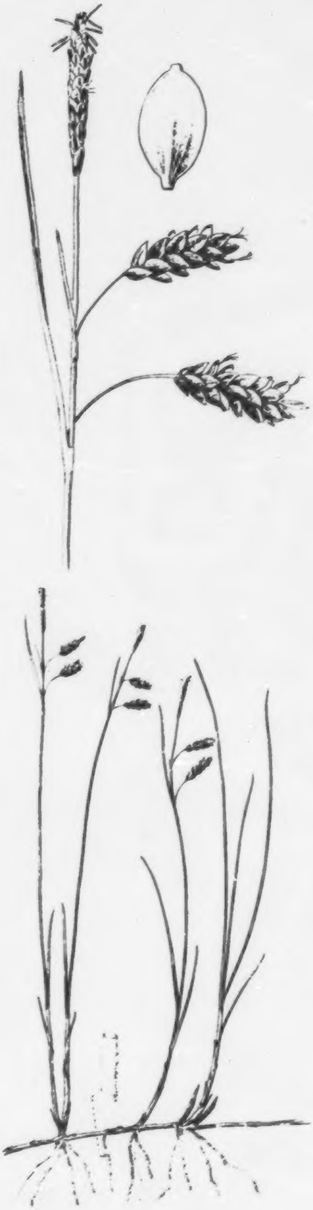


Habitat & Distribution:

Common in all but northern regions. Found on shores, in marshy areas, on slough margins, in wet meadows, in discharge areas, occasionally on more upland sandy sites where the water table is high.

Forage Value:	Fair to good, productive and considered palatable to all classes of livestock, apparently somewhat less so to wildlife; because it is widespread and often dominant, *C. lanuginosa* is rated as a primary range species.
Grazing Response:	An increaser #1, declining under conditions where wetlands are continuously and heavily utilized.
Notes:	Syn. *C. lasiocarpa*; the common name woolly sedge is probably one of the best field marks of the species, the hairy perigynia an identification tool separating this from other similar sedges; *C. lanuginosa* rates among our most valuable sedges in terms of soil binding properties, this due in part to its exceptionally wide range of adaptations and diverse distribution patterns; the very similar *C. lasiocarpa* is more site specific, often found in dense and sometimes nearly exclusive colonies on shores and in bogs.

Carex limosa L. - Mud Sedge



Growth Habit: **Plants from elongate, slender, scaly stolon-like rhizomes, the roots covered with yellowish felt; culms arising singly or a few together**, slender, 2-6 dm. tall, much exceeding the leaves, sharply triangular and roughened above.

Blades: Leaves 1-3 per culm, deeply channeled, **glaucous**, 1-3 mm. wide.

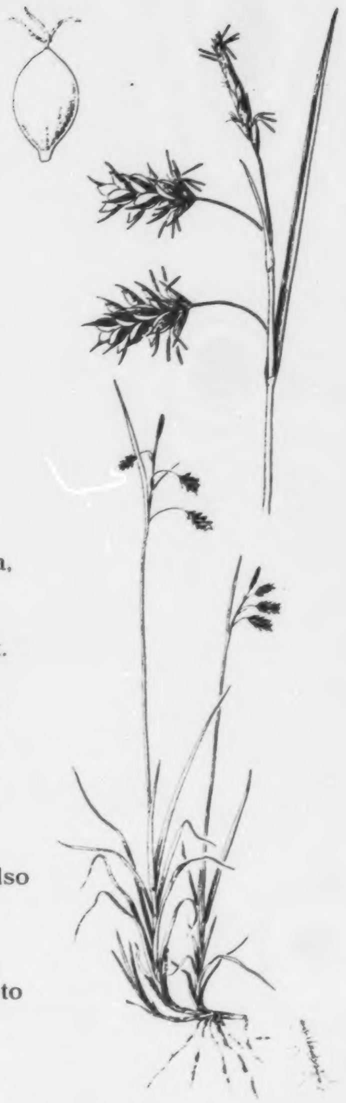
Sheaths: Upper sheaths pale, the lower red-tinged, brownish and fibrillose with age, plants strongly phyllopodic.

Ligules: Very short.

Heads: **Terminal spike staminate, 1-3 cm. long**, erect to drooping; **lateral 1-3 spikes pistillate, on long drooping, smooth peduncles, short cylindric, 1-2 cm. long**; lower bract leaf-like, 2-6 cm. long, upper bracts much reduced; **bracts sheathless; scales yellow-brown to purple-brown**, with a 1-3 nerved green centre, this often extending as a bristle; scales ovate-elliptic, **covering perigynia**, persistent; perigynia elliptic-ovoid, 2.5-4 mm. long; thick but flattened and two-edged with thick margins, firm, **glaucous green**, several nerved, papillose, substipitate at the base, **with a minute beak; stigmas 3**.

Similar Species:

1. ***Carex paupercula*** Michx. - Sedge
   A species of sphagnum bogs, and found in the same regions, except absent from the south.
   Differs as follows:
   - Rootstocks more deeply seated, culms often tufted.
   - Sheaths tending to be red-dotted ventrally.
   - Ligules conspicuous.
   - Leaves light green, usually not glaucous.
   - Staminate spike 4-12 mm. long.
   - Pistillate scales narrower than perigynia, long acuminate.
   - Perigynia rounded and scarcely beaked at apex.



Habitat & Distribution:

Common in the foothills/Rocky Mountain and boreal forest regions.
Grows in sphagnum bogs and fens.

Forage Value:

Poor, relatively unproductive, also inaccessible for much of the season.

Grazing Response:

Increasers; although restricted to bogs and marshes, both *C. limosa* and *C. paupercula* spread readily due to extensive rhizome growth when habitat requirements are met.

Notes:

A with other strongly rhizomatous species, both sedges have the ability to establish quickly following disturbance, binding soil, and over time, contributing to the building of organic bog soils; *C. paupercula* is more restricted to sphagnum bog ecosites, *C. limosa* of the same habitats but also present in fens which show overall improved soil nutrients and thus increased productivity.

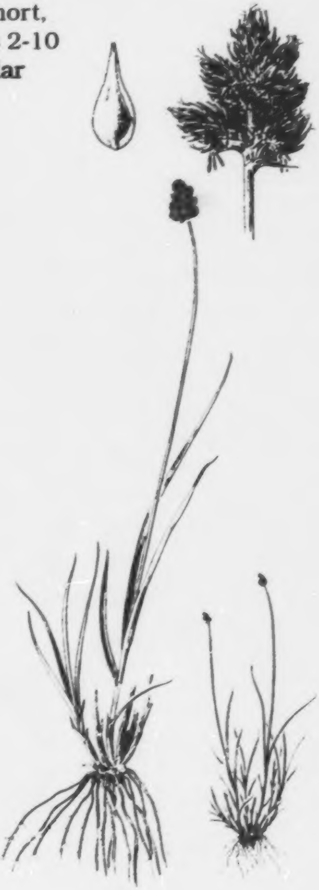
Carex microptera Mack. - Thick-spike Sedge

Growth Habit: **Very densely caespitose**, from short, stout, blackish rootstocks; culms 2-10 dm. tall, striate, **sharply triangular and roughened above**, much exceeding the leaves.

Blades: Mostly flat, firm, 2-4.5 mm. wide, on the lower 1/3 of culms.

Sheaths: Tight, the upper pale green, white-hyaline ventrally, the lower brown-dark brown, plants aphyllopodic.

Heads: Spikes 5-10, **gynaecandrous, rather compact in an ovoid-subcircular**, truncate-based head, **1-2 cm. long; lowest bract short** and awn-like, upper bracts short, scale-like; **scales narrower and shorter than perigynia**, ovate-lanceolate, **dull brown** with a faint, lighter midrib; perigynia thin, lanceolate-ovate, 3-4.5 mm. long, spreading-ascending, **pale green to brown, mostly nerved on both surfaces, and thin wing-margined**, the tip rounded (terete), **blackish**, shallowly cleft; **stigmas 2**.



Similar Species: The *C. microptera/maclovina* complex contains a number of very closely related species, these variously treated by taxonomists. Some prefer to identify them as distinct species, others lumping all entities as variations of the one species *C. maclovina* or *C. microptera*.

Habitat & Distribution: Common in all regions except the northern boreal forest and the prairies, sometimes at high elevations.

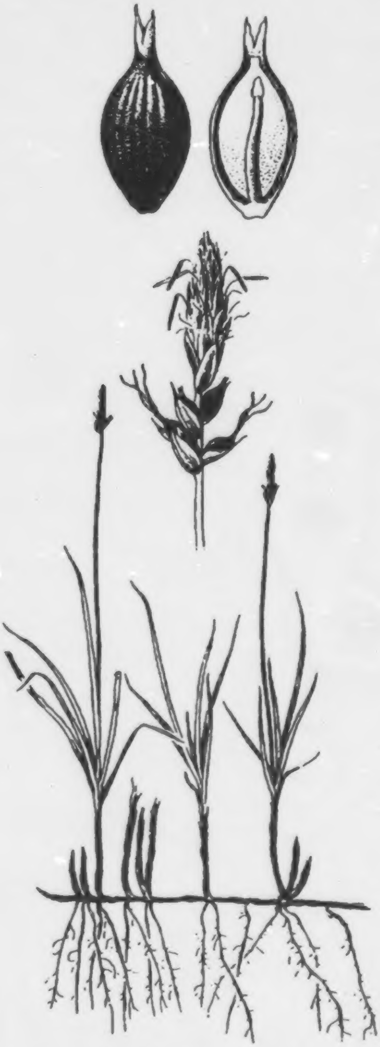
Grows in a variety of moist habitats: in moist woods, in wet meadows, around sloughs.

Forage Value: Fair, moderately palatable to both livestock and game; although seldom occurring in dense or continuous stands, *C. microptera* produces fair quantities of forage, also has some curing properties and is readily eaten as a component of native hay.

Grazing Response: An increaser #1; the species frequently grows on primary range, and will decline along with palatable bunch grasses when closely and continuously grazed; the presence of healthy populations of *C. microptera* is an indication of good condition rangeland.

Notes: Syn. *C. festivella*, *C. limnophila*; also appropriately known as ovalhead sedge; the species is part of a rather obscure taxonomic complex that is variously lumped and split, depending on both scientific perspective and the degree of variation in specific populations; *C. microptera* grows readily in disturbed areas and can be successfully transplanted into native gardens; it is considered to have a wide range of adaptations provided moisture requirements are met.

Carex obtusata Lilj. - Blunt Sedge



Growth Habit: Plants from **long, slender, scaly, dark purplish-black rhizomes**; culms solitary or 2-3 together, **6-15 cm. tall, slender, sharply triangular above and roughened on angles**.

Blades: **1-1.5 mm. wide,** usually not exceeding culms; **slender**, nearly flat, several per culm, basal or nearly so, roughened on margins, midribs below, and often on prominent nerves above.

Sheaths: Tight, truncate at mouth, **lower ones purplish,** veiny, **not readily shredding**, aphyllopodic.

Ligules: Very short.

Heads: **Spikes solitary, staminate flowers above pistillate, 5-12 mm. long**; pistillate scales mostly smaller than perigynia, pale brown, pale on margins and midvein; perigynia 1-6, ascending, **plump, hairless, shining**, thick and firm, **3-4 mm. long, dark brown-black, finely many nerved**; beaks to 1 mm. long, smooth, pale-tipped, cleft with age, oblique; **stigmas 3**.

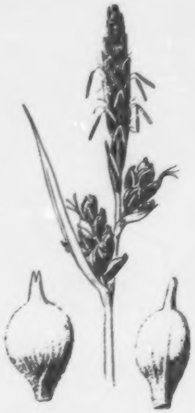
Habitat & Distribution: Frequent throughout most regions.
Found in dry, often sandy prairie grassland, on ridges and dry slopes, sometimes at relatively high elevations. As compared to *C. stenophylla*, blunt sedge indicates improved soil and/or moisture conditions.

Forage Value: Fair; *C. obtusata* is a relatively nutritious species, but produces little forage, often growing below grazing level, although some reports indicate that, where it forms dominant cover, it does provide some forage.

Grazing Response: An increaser and indicator of overgrazing, opportunistic when more productive species disappear with heavy utilization.

Notes: From a reclamation perspective, *C. obtusata* is of rather limited value, but does function to some extent in erosion control when occurring in loose sandy soil.

Carex pensylvanica Lam. var. *digyna* Boeckl. - Sun-loving Sedge

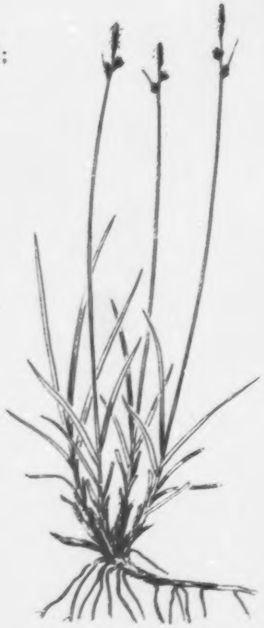


Growth Habit: **Densely caespitose**, also **producing extensive rhizomes, these reddish-brown**, with **shredding scales; culms all elongate, 0.5-3 dm. tall**, slender, wiry, scabrous on angles above.

Blades: 1-3 mm. wide, flat, sometimes exceeding culms, stiff, dull green, **often numerous**, usually smooth below, veiny and scabrous above; margins scabrous.

Sheaths: Lower sheaths conspicuous, **reddish-brown, prominently fibrillose-shredding**; aphyllopodic.

Ligules: Much wider than long.



Heads: **Terminal spike staminate**, peduncled; lateral 1-3 spikes pistillate, mostly sessile, **closely associated**, each with 5-15 ascending perigynia; lowest bract 1-3 cm. long, shorter than upper spikes, upper bracts reduced; **pistillate scales about same length as perigynia**, ovate, blunt to short-pointed, red-brown to tawny; perigynia two-keeled, **densely pubescent**, stipitate, **the achene filling the upper part of body; beak short, deeply cleft; stigmas 3**.

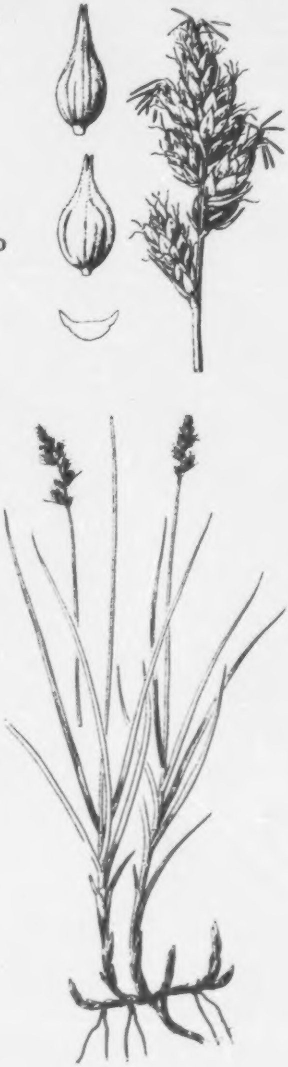
Habitat & Distribution: Common throughout most regions. Found in open, dry woods, open grassland, often associated with *Festuca campestris* and *Festuca hallii*.
Grows in sandy grassland, and in very dry regions, is restricted to snow melt areas, moist slopes. Does not grow on infertile or otherwise poor soils.

Forage Value: Good, a productive species and also palatable to all classes of livestock and game; *C. pensylvanica* is especially important for early season use and again in the fall if late season moisture is sufficient to stimulate regrowth.

Grazing Response: An increaser #1 in better moisture zones, classed as a decreaser in driest regions and those prone to heavy grazing; because of their extensive root systems, plants can tolerate some seasonal drought as well as trampling that results from livestock activity.

Notes: Syn. *C. heliophila*; as the common name suggests, *C. pensylvanica* is a grassland species, its presecnce in the prairie region as much an indicator of better soils as improved moisture conditions; the massive tangle of roots functions to bind soil and, as with other more productive sedges, has played an important role in building soil over time.

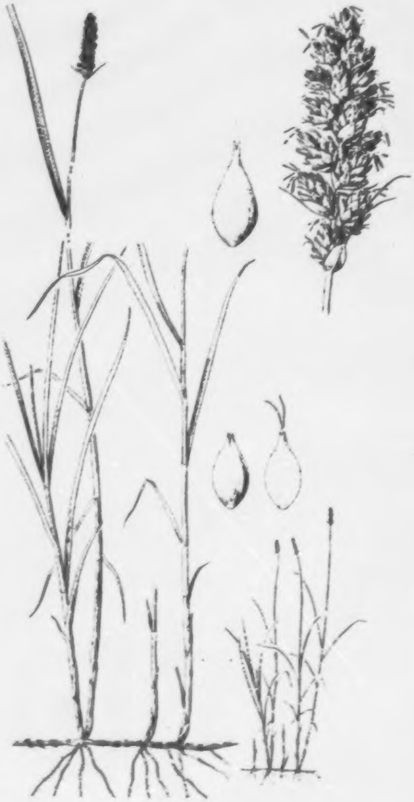
Carex praegracilis W. Boott - Graceful Sedge



Growth Habit:	**Plants with extensive, long, thick, black rhizomes; culms 2-7.5 dm. tall**, arising singly in small clumps, sharply triangular and **scabrous above**.
Blades:	1.5-3 mm. wide, elongate, 1-3 dm. long, borne near base, flat to channeled; smooth below, smooth to scabrous above; margins scabrous.
Sheaths:	Truncate at mouth; **lower sheaths smooth, blackish, conspicuous**, resembling the rhizomes in colour; **upper sheaths hyaline to brownish**; somewhat aphyllopodic.
Ligules:	Very short.
Heads:	Heads 1-5 cm. long, with 5-15 spikes, **these mostly aggregated, usually androgynous** but occasionally mostly staminate or pistillate; bracts scale-like; scales about the size of perigynia, ovate, often acuminate, brownish with hyaline margins, midribs pale to green; **perigynia thin edged but not wing-margined, 3-4 mm. long, substipitate**, dark brown, thick and firm, lightly nerved dorsally, nerveless ventrally; **beaks about half the length of perigynia; stigmas 2**.

Similar Species:

1. ***Carex sartwellii*** Dewey - Sartwell's Sedge
Most common in the foothills/Rocky Mountain region, occasional elsewhere. Found in wet meadows and swamps. Distinguished as follows:
   - Plants from long, tough fibrillose rhizomes.
   - Culms stout, 4-8 dm. tall, rough above, brownish at base.
   - Upper sheaths green-striate ventrally.
   - Heads numerous, densely aggregated into an elongate head, androgynous.
   - Perigynia thin-margined above, serrate.
   - Perigynia 2.5-3 mm. long, nerved on both sides, short beaked, this cleft.



Habitat & Distribution:

Common in southern regions, more sporadic northward.
Found in wet places: in wet meadows, swampy areas, around sloughs.
Moderately tolerant of alkali, and frequent in moist alkaline habitats.

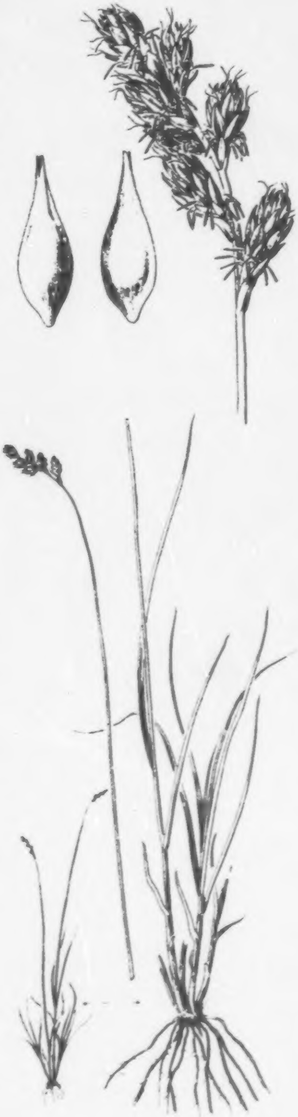
Forage Value:

Good, as with many of our sedges, forage values are often underestimated; utilization of *C. praegracilis* tends to be heaviest in early spring and again after freeze-up when it can supply fair quantities of late season forage; it is sometimes a component of native hay, and when fed with high protein supplements, is considered good winter feed.

Grazing Response: An increaser #1.

Notes: Also known as nutgrass, a possible reference to the firm mature perigynia; *C. praegracilis* has considerable soil binding properties due to strong rhizome growth; it is valued especially in the prairie region to stabilize moist and often alkaline soils.

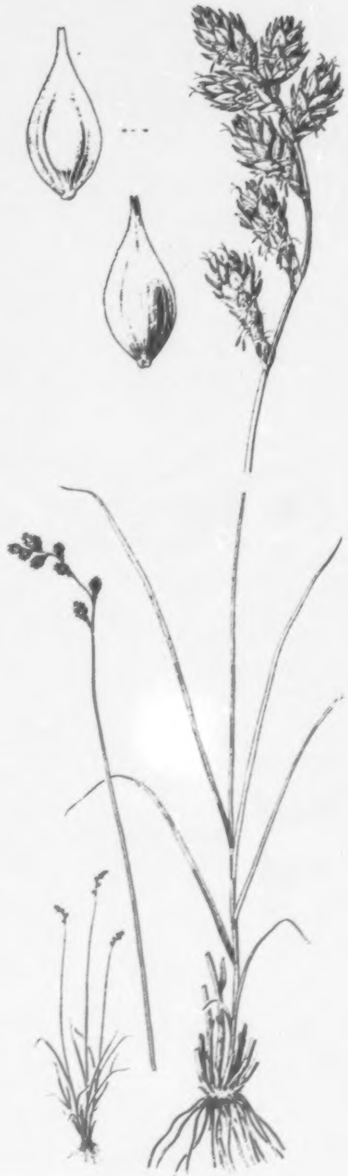
Carex praticola Rydb. - Meadow Sedge



Growth Habit:	**Densely tufted**, from short blackish rootstocks, rhizomes absent; culms **2-7 dm. tall, slender, flexible**, much exceeding leaves, **smooth**, weakly triangular, nerves prominent.
Blades:	**1-3 mm. wide**, 2-4 per culm, clustered near base, flat, relatively **thin and soft**, mostly smooth except for finely roughened margins; **often somewhat wrinkled and pitted when dry**.
Sheaths:	Tight, **lower ones tawny to light brown.**
Heads:	**Spikes 2-7, pistillate flowers above staminate, in a flexible head**; bracts smaller, scale-like; scales reddish-brown, with green centre and pale margins, **as wide and as long as perigynia**, and mostly concealing them; perigynia ovate-lanceolate, **4.5-6.5 mm. long**, pale greenish, **wing-margined**, toothed, finely nerved below, **usually nerveless above**; beaks to one half length of body, **rounded**, reddish-brown, tip pale; **stigmas 2**.

Similar Species:

1. ***Carex aenea*** Fern. - Silvery-flowered Sedge Occasional, scattered distribution throughout the boreal forest and foothills/montane regions. A species of open woods and meadows, in western areas an indicator of submesic – mesic sites, associated with rough fescue and sometimes Richardson needle grass in the absence of woody encroachment. Distinguished as follows:
    - Tufted plants, culms 4-9 dm. tall, firm but often nodding, smooth.
    - Leaves flat, 2-4 mm. broad, soft.
    - Spikes in a flexuous, elongate head.
    - Spikes 3-10, all but the upper separate.
    - Scales acute-acuminate, about as long and wide as perigynia.
    - Perigynia 4-5 mm. long, the beak flattened, serrate to tip, bidentate.
    - Perigynia nerved dorsally, nerveless or basally nerved ventrally.
    - Perigynia pale green-tawny, sometimes darker at base.



Habitat & Distribution: Widely distributed in forested regions.
Found in open woods and clearings, in moist montane meadows, moist grassland.

Forage Value: Fair, moderately nutritious, also fairly palatable to all classes of livestock, especially so to sheep and goats.

Grazing Response: An increaser #1, possibly a decreaser in some areas; *C. praticola* is non-rhizomatous, entirely dependent upon seed for reproduction, and, as such, populations are threatened in areas where the species is heavily utilized.

Notes: Sometimes known as meadow sedge; from an environmental perspective, the fibrous root system of this and other similar species can be valued for their soil building properties; also a relatively prolific seed producer, *C. praticola* shows some potential for development, provided difficulties with poor germination can be overcome.

Carex raymondii Calder - Sedge

Growth Habit: Densely densely tufted from short, stout ascending rootstocks; culms slender, **3-7 dm. tall**, distinctly triangular, somewhat roughened on angles above.

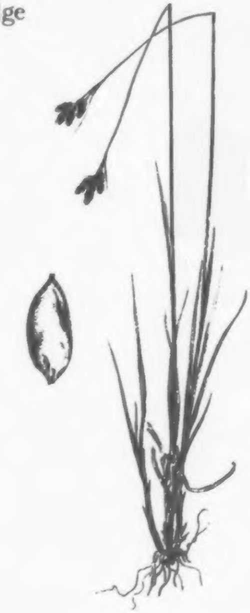
Blades: Leaves shorter than culms, clustered near the base, up to 15 per culm, mostly flat, to 5 mm. wide.

Sheaths: Upper sheaths pale-hyaline ventrally, the lower bladeless ones **brownish-purple to purple-black**; somewhat nodulose; plants **aphyllopodic**.

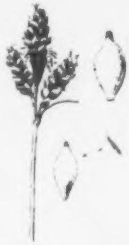
Heads: Spikes mostly about 4, the **terminal gynaecandrous**, the lateral pistillate or with a few basal perigynia; spikes, at least the lower, **well separated and nodding** on slender flower stalks; lowest bract elongate but usually shorter than inflorescence; scales narrowly ovate, 2.5-3 mm. long, acute to acuminate, mostly shorter than perigynia, **purple-red with pale midvein and margins**; perigynia 2.5-3.5 mm. long, **weakly inflated, greenish-brown to chestnut brown**, often tinged with red-brown, 2-ribbed and otherwise nerveless, **granular**, the beak about 0.4 mm. long, cleft, red-brown; **stigmas 3**.

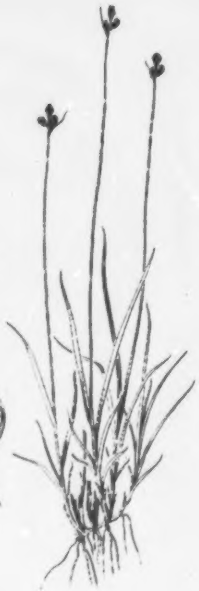
Similar Species:

1. *Carex atrosquama* Mack. - Sedge
   Frequent in the foothills/Rocky Mountain regions. Found in open woods, moist meadows.
   Differs as follows:
   - Plants also tall, but usually not exceeding 5 dm. in height.
   - Blades more phyllopodic, the previous year's blades also still conspicuous (blades also relatively broad, to 3.5 mm. wide).
   - Spikes (3-4) mostly erect.
   - Scales without whitish midvein and margins.
   - Perigynia not flattened, inflated, olive-green and usually purple-spotted.

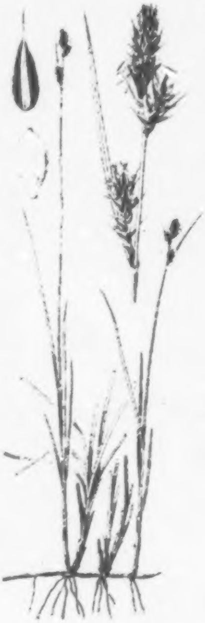


2. ***Carex norvegica*** Retz. - Sedge
Found in most regions, absent from prairie and drier parkland areas. A species of moist woods, often along shaded stream banks.
Distinguishing characteristics:
   - Loosely tufted, stoloniferous plants 2-6 dm. tall.
   - Blades soft.
   - Culms slender, sometimes arched.
   - Spikes mostly 3, pistillate, terminal one gynaecandrous.
   - Pistillate scales about 2 mm. long, much shorter than perigynia, purple-black with hyaline margins.
   - Perigynia inflated, 2-3.5 mm. long, glabrous, often granular, pale with a dark beak.





3. ***Carex buxbaumii*** Wahlenb. - Sedge
Found in northern boreal regions, but locally best known from montane areas where sometimes abundant. A bog species, often in calcareous areas, and an indicator of some bog ecosites.
Distinguished as follows:
   - Plants from long scaly rhizomes, often somewhat tufted.
   - Old leaves not present at base of new culms.
   - Plants red-purple, shredded at base.
   - Culms firm, 2-8 dm. tall, with leaves on lower half.
   - Spikes 2-5, not drooping, lowest separate.
   - Terminal spike gynaecandrous, the lateral sessile, pistillate.
   - Scales brown, mostly awned.
   - Perigynia glaucous, to 4 mm. long, with 2 prominent ribs and finer nerves, papillose.
   - Beak short, purplish.



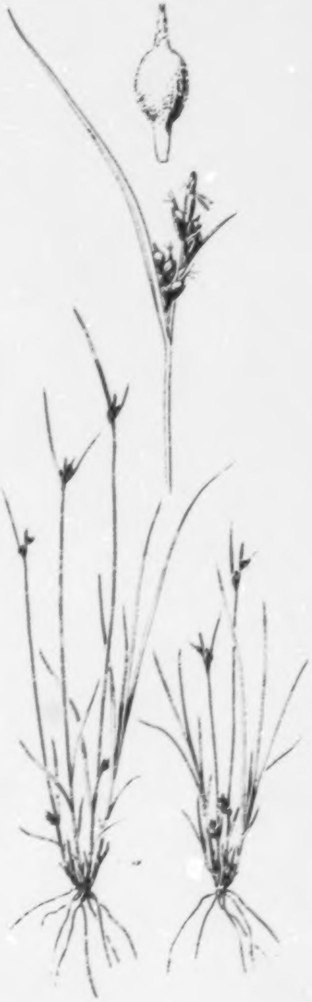
Habitat & Distribution: Frequent in the foothills, montane and boreal forest regions. Found in moist grassland and ravines, in open, moist woods, on damp (often calcareous) slopes.

Forage Value: Fair, producing relatively large amounts of forage when strong populations occur; *C. raymondii* often inhabits primary grazing areas and as such is easily accessed by both livestock and game.

Grazing Response: An increaser #1, locally abundant in some regions, also producing an adequate seed crop to replenish stands; because of its habitat preference, *C. raymondii* can be susceptible to overgrazing and in these cases may decline along with palatable bunch grasses in the absence of proper grazing management.

Notes: Both *C. raymondii* and *C. atrosquama* are attractive and show some potential for development as ornamentals, also as reclamation species, the former well adapted to most cool, wooded areas, the latter more restricted to moist meadows in the Rocky Mountain region.

Carex rossii Boott - Ross' Sedge



Growth Habit: Loosely caespitose from ascending, thick, somewhat woody purplish, very short rootstocks; culms wiry but slender, 5-30 cm. tall, some elongate and others hidden in basal sheaths.

Blades: Leaves firm and stiffly erect, flat and somewhat channeled above, the margins slightly rolled, 1-2.5 mm. wide, scabrous below and on margins.

Sheaths: Lower sheaths purplish, finely scabrous-hairy, not readily fibrillose (old sheaths somewhat shredded with age).

Heads: Terminal spike staminate, elongate, up to 1.5 cm. long; lateral 2-3 spikes pistillate, the lower usually remote, hidden in lower sheaths; pistillate spikes closely 3-15 flowered, the lowest on slender flower stalks, the upper subsessile; lowest bracts elongate and leaf-like, 0.5-5 cm. long, usually exceeding the inflorescence; pistillate scales ovate, acute to bristle-tipped, distinctly shorter than perigynia, with a broad green centre, bordered by purple-brown and sometimes the margins narrowly hyaline; perigynia 3-4.5 mm. long, 2-keeled and otherwise nerveless, greenish and purple tinged toward beak, pubescent; perigynia short-stipitate and with a cleft beak about 2/3 as long as the body; achenes filling upper portion of perigynia; stigmas 3.

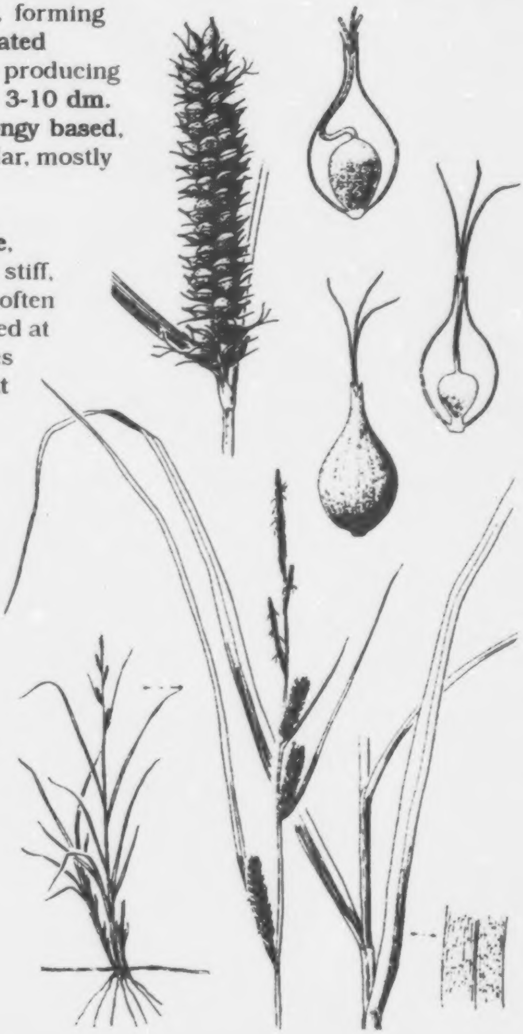
Habitat & Distribution: Frequent in wooded regions throughout, most common in the foothills and Rocky Mountain Ecoregions.
Found from low to subalpine elevations.
Grows in rather dry, well drained places; in open forests, on rocky slopes and cutbanks, on rocky and sometimes sandy soil.

Forage Value: Fair; in optimum conditions and where abundant, fairly productive and palatable.

Grazing Response: An increaser #1, declining under continuous and heavy utilization.

Notes: Closely related to *C. pensylvanica*. *C. rossii* plays a similar soil conservation role in northern and western regions, and is known as a species important in watershed protection in its adapted range.

Carex rostrata Stokes - Beaked Sedge



Growth Habit:	**Densely tufted**, forming **stout, deep-seated rhizomes**, also producing stolons; **culms 3-10 dm. tall, stout, spongy based**, bluntly triangular, mostly smooth.
Blades:	**4-12 mm. wide**, elongate, thick, stiff, **nodulose**, flat, often rolled, channeled at base, lower ones often **somewhat spongy**, **pale to yellow-green**.
Sheaths:	Concave to truncate at mouth, **nodulose**, the **lower ones spongy, thick, red-tinged, little fibrillose.**
Ligules:	Wider than long, round at top.
Heads:	**Staminate spikes 2-4**, linear, only upper stalked; **pistillate spikes 2-5**, the lower short stalked, not closely aggregated, **40-150 flowered**, the perigynia ascending or spreading, not sharply reflexed; bracts leaf-like, little sheathing, the lower exceeding the inflorescence but not more than twice inflorescence length; pistillate scales narrow, long-pointed, nearly the length of perigynia, purplish, with green

midribs and pale margins; perigynia **4-8 mm. long, purplish-tinged, 8-12 (14) nerved, hairless, shining, inflated**, pitted; **beaks 1-2 mm. long, cleft; stigmas 3**.

Habitat & Distribution: Common and widely distributed.
Found in wet meadows, in marshes and fens, on shores, sometimes in shallow water, not as tolerant of poorly drained, nutrient-poor bogs as *C. aquatilis*.

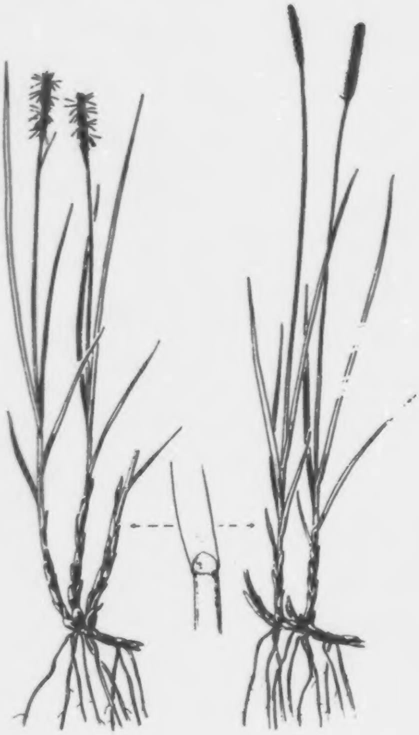
Forage Value: Good, with crude protein levels at about 18% until mid-summer; plants are palatable early in the season, but often inaccessible to livestock at this time; beaked sedge makes fair quality hay if it can be cut early, but (as with most wetland species) hay is rather light and is best supplemented with high protein feed.

Grazing Response: A decreaser, in spite of its strong rhizomatous habit, declining when wetlands are utilized heavily.

Notes: The specific name *rostrata*, in Latin, means beaked; *C. rostrata* is valuable from a reclamation standpoint, the root system with erosion control properties similar to those of other rhizomatous wetland species.

Carex scirpoidea Michx. var. ***scirpoidea*** - Rush-like Sedge

Growth Habit: Plants solitary or a few together, **from thick, woody, dark red-purple scaly rootstocks**; culms 1-4 dm. tall, **stiff**, sharply triangular, scabrous above.



Blades: Leaves 2-4 per culm, near the base, flat to somewhat channelled, 1-3 mm. wide, **firm**.

Sheaths: Tight, the **lower purple**, somewhat fibrillose, **somewhat hairy ventrally**; plants aphyllopodic.

Ligules: Short.

Heads: Spikes **normally solitary** (sometimes compound basally), **linear, erect, entirely staminate or pistillate**, the later 1.5-3 cm. long; bracts rudimentary to 2 cm. long, shorter than spike, dark-auricled; scales ovate, somewhat shorter than perigynia, obtuse, **finely hairy, ciliate**, dark brown to black with a pale midrib and narrow pale margins; perigynia numerous, **white-pubescent**, ovoid-oblong, 2.5-3 mm. long, abruptly narrowed to a short slightly cleft beak; achenes very short-stipitate; **stigmas 3**.

Related Species:

1. Var. ***stenochlaena*** Holm.
   Differs as follows:
   - Perigynia longer, 3-4.5 mm. long, and narrower (lanceolate), and flatter.
   - Achenes slender-stipitate.

Habitat & Distribution: Common in foothills/Rocky Mountain regions, occasional eastward. Found from low to alpine elevations.

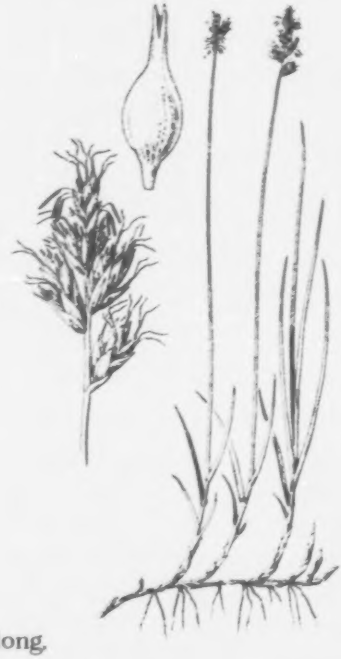
Grows in moist, often calcareous areas, depressional meadows, on shores, on open subalpine/alpine slopes and rocky ridges. On upland sites, an indicator of discharge (often calcareous) ecosites.

Forage Value: Fair, members of the group (*Scirpinae*) generally considered palatable, and can supply moderate amounts of forage when abundant.

Grazing Response: An increaser #1, often prone to overgrazing when populations occur in low meadows along streams and in other primary use areas.

Notes: The name *scirpoidea*, from the Latin *scirpus*, bulrush, is suggestive of the species' superficial resemblance to bulrushes; *C. scirpoidea* has superior soil binding properties, and significant populations are worth preserving for both their grazing and environmental value.

Carex siccata Dewey - Hay Sedge



Growth Habit: **Plants with long slender creeping rhizomes**, these covered with medium brown, **sometimes fibrillose scales**; culms 1-3 together, **often single, 2-9 dm. tall**, sharply angled and scabrous above.

Blades: 1.5-3 mm. wide, stiff, shorter than culms, flat to channeled, several per culm, clustered near the base; sterile shoots more leafy; mostly smooth, margins scabrous.

Sheaths: Overlapping, hyaline ventrally, **lower brownish**, aphyllopodic.

Ligules: Wider than long.

Heads: Spikes 4-12 in a head 2-4 cm. long, the lower somewhat separate; **gynaecandrous but middle spikes often entirely staminate and the lower entirely pistillate**; bracts small, scale-like; pistillate scales shorter than perigynia, brownish with hyaline margins and 3-nerved green centre, this sometimes prolonged as a short awn; perigynia 3-6 mm. long, oblong-lanceolate, greenish to brown-tinged, **wing-margined, nerved on both surfaces**; beaks serrate, **bidentate; stigmas 2**.

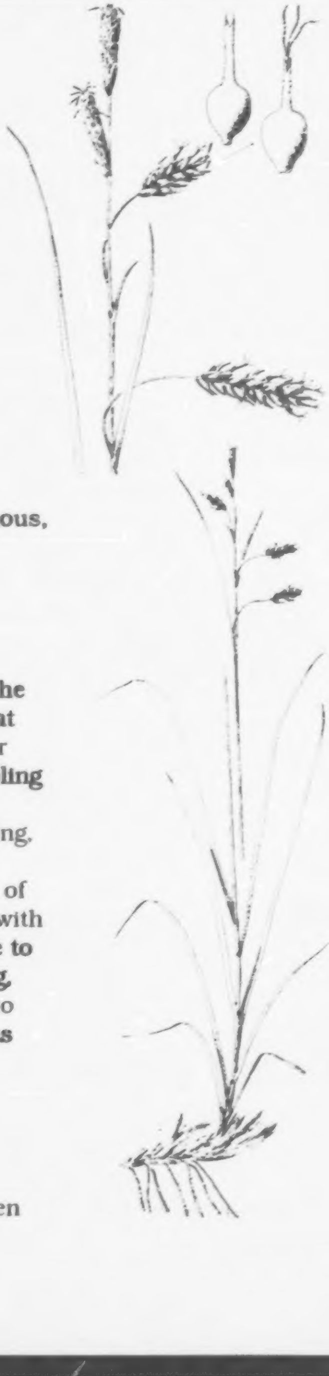
Habitat & Distribution: Common throughout most Ecoregions except the dry prairie region. Found in dry woods, sandy pine forests, clearings, open grassland.

Forage Value: Fair, moderately palatable, and where plentiful, does supply appreciable quantities of forage; as the common name implies, *C. siccata* is sometimes a component of native hay.

Grazing Response: An increaser, aggressive because of rapid rhizome growth but not invasive.

Notes: Syn. *C. foenea*; *C. siccata* is adapted to an exceptionally wide range of habitats, from rather dry, often sandy woods to grasslands and meadows; for this reason and also because it acts as an early successional species on disturbances, its potential in revegetation and reclamation efforts is considerable.

Carex sprengelii Dewey - Sprengel's Sedge



Growth Habit: **Densely caespitose**, with tough, matted, somewhat elongate, **densely fibrillose, brown rootstocks**; culms 3-9 dm. tall, sharply triangular, scabrous above.

Blades: 1.5-4 mm. wide, elongate but shorter than culms, **flat, soft, grass-like**, numerous, 5-8 per culm, scattered along culms, scabrous above and on margins, smooth below.

Sheaths: Long, concave to truncate at the mouth, smooth; **lower sheaths brownish, the old ones persistent, very conspicuous, shredded-fibrillose**.

Ligules: Very short.

Heads: Spikes 2-7, **the upper 1-3 staminate, upper peduncled, the lower 2-4 pistillate, separate, at least the lower drooping**, flower stalks scabrous; **bracts resembling leaves, lowest as long as inflorescence** and short sheathing, upper reduced and sheathless; pistillate scales about the length of the perigynia, **brownish-tinged** with green centre and margins, **acute to awned; perigynia 5-6 mm. long, green, glossy, glabrous**, with two marginal ribs, **the beak about as long as the body, oblique, bidentate; stigmas 3**.

Habitat & Distribution: Frequent in southern regions, sporadic northward. Found in moist grassland, in open woods and clearings, moist banks. Particularly common in moist coulees, alluvial slopes, grassy snow melt areas, grassland and shrubby areas where springs or seepages occur.

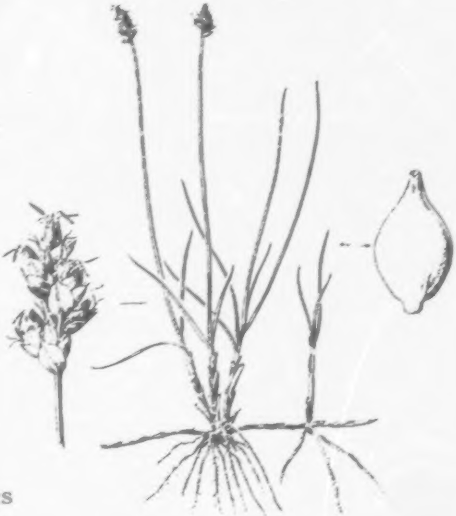
Forage Value: Fair to good, palatable to all classes of livestock and wild ungulates, also productive as both pasture and as a component of native hay.

Grazing Response: An increaser #1, the tough root systems resistant to heavy trampling, but stands declining when heavy and continuous grazing prevents seed production and reduces vigor.

Notes: Because of its dense, heavy root system, *C. sprengelii* can be valued for both its soil building and binding properties; as with many sedges, propagation by seed can be difficult due to low seed viability and possibly a dormancy factor.

Carex stenophylla Wahl. ssp. ***eleocharis*** (Bailey) Hult. - Low Sedge

Growth Habit: Plants from **long, slender, scaly, brownish rhizomes**, these somewhat fibrillose; **culms 3-15 (20) cm. tall, slender, bluntly angled, smooth**, solitary or few together.



Blades: **1-1.5 mm. wide at base, narrower above**, 3-15 cm. long, tapering to a long tip, flat to channeled, sometimes inrolled; 1-4 per culm, borne near base; **light green, or yellow-green**, mostly smooth.

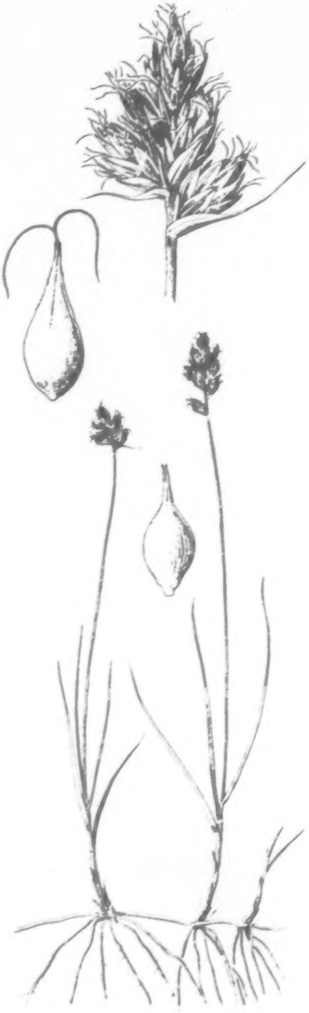
Sheaths: Hairless, smooth, the **lower brownish**, only somewhat fibrillose.

Ligules: Wider than long.

Heads: **Spikes 3-5**, aggregated into terminal heads, **staminate flowers above pistillate**; bracts short, scale like, the lower often short-pointed; pistillate scales brownish with pale margins, ovate, short-pointed, about the length of the perigynia; perigynia **2.5-3 mm. long**, 8 or less per spike, thick and firm, nerveless above, nerved below, dark brown-black at maturity, **the beaks 1/4-1/3 the length of body**, toothed; **stigmas 2; anthers about 2 mm. long**.

Similar Species:

1. ***Carex douglasii*** Boott - Douglas Sedge
   Restricted to southern regions, found in open, dry, often sandy grassland, slightly depressional and especially alkaline places.
   Differs as follows:
   - Plants somewhat taller (to 3 dm.), and leaves longer (to 20 cm.).
   - Male and female heads usually on separate plants.
   - Anthers longer (3-4 mm.), conspicuous.
   - Pistillate scales acuminate/short-pointed.
   - Perigynia 3.5-4 mm. long, the beak more than ½ the length of the body.



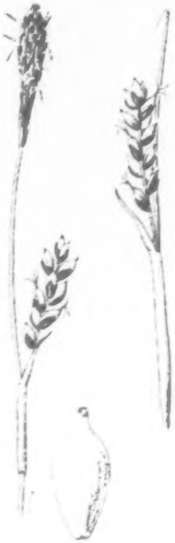
Habitat & Distribution: Common in the south, occasional northward. Grows in dry prairie grassland, on open dry slopes, sometimes at higher elevations. Common throughout prairie region and unlike *C. pensylvanica*, grows on poor, often infertile soils.

Forage Value: Poor, although moderately palatable and of some value nutritionally, the species produces little forage and is generally only palatable in the spring.

Grazing Response: An increaser and indicator of heavy grazing, very resistant to trampling and low clipping.

Notes: Syn. *C. eleocharis*; although an undesirable range species, *C. stenophylla* is often a pioneer on shallow disturbances and in these cases does aid considerably in soil stabilization; it has an adaptive advantage over many associated species as it is tolerant of drought and poor, infertile soils.

Carex vaginata Tausch - Sheathed Sedge

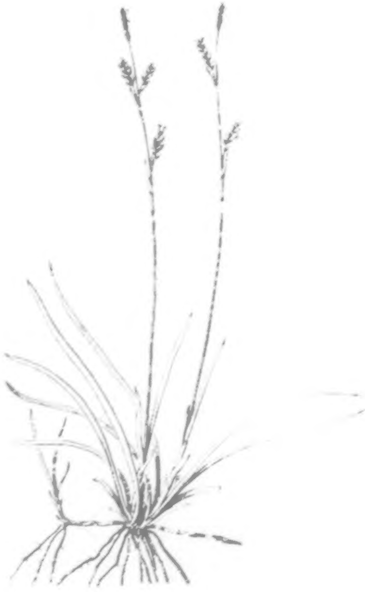


Growth Habit: **Plants from well developed slender, brownish creeping rhizomes**; culms bluntly angled, smooth, **slender**, lax, arising singly or a few together, 1-4 dm. tall.

Blades: 2-4 mm. wide, short to nearly as long as culms, **flat, bright green, lax, soft**, smooth except on margins.

Sheaths: Glabrous, tight, the lower brownish, somewhat fibrillose; usually phyllopodic.

Heads: **Terminal spike staminate, long-flower stalkd, lateral 1-3 spikes pistillate or occasionally androgynous, widely separate, peduncled but erect**; bracts with blades 1-4 cm. long, **long-sheathing**, especially the lower ones, sheaths 1-3 cm. long; **pistillate scales reddish-brown**, with hyaline margins and green midribs, shorter than perigynia; **perigynia 3-5 mm. long, greenish**, obscurely nerved, **beaks about 1 mm. long, oblique and copper-tinged at tip, not cleft; stigmas 3**.



Habitat & Distribution: Common in the boreal forest, foothills and montane regions. Found in moist woods, around springs, in muskegs, bogs, often associated with sphagnum. In many cases, an indicator of hygric black spruce lower slope sites.

Forage Value: Poor to fair, usually not producing sufficient quantities of herbage to be considered valuable as a grazing species.

Grazing Response: An increaser, but high populations more a reflection of ecosite type rather than grazing intensities.

Notes: As with other strongly rhizomatous sedges, *C. vaginata* has good soil binding properties, although it is found most frequently in mossy places along quiet or slow moving water where naturally occurring soil erosion is often less evident; *C. vaginata* has the ability to re-establish quickly (vegetatively) following disturbance and also persist into the stable, climax plant community.

ELEOCHARIS R. Br. - Spike Rush

Common Characteristics

- Culms rounded to angled, leafless.
- Leaves mostly reduced to bladeless sheaths, these all basal.
- Inflorescence a solitary, terminal spike.
- Flowers perfect.
- Scales spirally overlapping.
- Perianth usually present as bristles.
- Style bases enlarged as tubercles, these persistent on achenes.

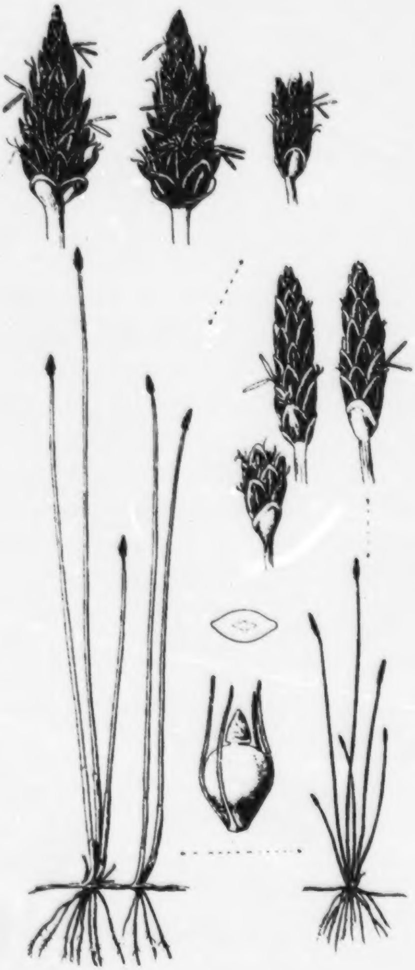
Key to Eleocharis

1. Robust perennials 1-8 dm. tall; styles 2-cleft, achenes lens-shaped. *E. palustris*

Very slender perennials 3-12 cm. tall; styles 3-cleft, achenes 3-sided. *E. acicularis*

Eleocharis palustris (L.) R. & S. - Creeping Spike Rush **Plate #32**

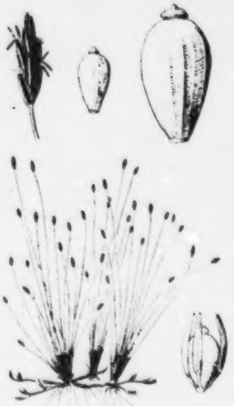
Growth Habit:	Perennials, with **long, stout, reddish creeping rhizomes**; culms tufted or scattered, **1-8 dm. tall, stout**, rounded to somewhat compressed.
Blades:	Absent.
Sheaths:	Smooth, strongly nerved, oblique and **red-dotted at summit, conspicuously red-purple at base.**
Heads:	Spikes **5-20 mm. long**, with 1-3 sterile scales at base; upper scales reddish-brown, lanceolate, pointed, rarely blunt; bristles slightly longer than achenes, usually 4 per flower; achenes **1.5 mm. long, lens-shaped**, with an **egg-shaped tubercle** half the width of the achene, constricted at the base; **stigmas 2**.



F4

Similar Species:

1. ***Eleocharis acicularis*** (L.) R. & S. - Needle-like Rush
   Common, most frequent in parkland and boreal forest regions. Grows on shores and mud flats, in marshy places, sometimes in shallow water.
   Differs as follows:
   - Very fine, carpet-forming perennials from slender rhizomes.
   - Culms very narrow, 3-12 cm. tall.
   - Sheaths often red-purple.
   - Spikelets only 2-7 mm. long.
   - Achenes 0.7-1 mm. long, nearly circular in cross-section, longitudinally and transversely ridged.
   - Tubercles well formed, stigmas 3.



Habitat & Distribution:

Very common throughout most regions.
Found in wet places: on shores, around sloughs, sometimes in shallow water.
Tolerant of moderate alkali, and often found on depressional alkali flats.

Forage Value:

Good, with high protein, phosphorus and carbohydrate contents and low in fiber during spring and summer; plants are palatable, particularly so to horses, until later in the season when sloughs dry; *E. palustris* is sometimes a component of native hay, but by the time wetlands dry both nutritional value and palatability have usually dropped considerably.

Grazing Response:

A decreaser, sometimes an increaser #1, depending on abundance of other palatable forage and accessibility of wetlands; the tough creeping root system gives the species fairly good resistance to heavy grazing and trampling.

Notes:

From the Greek *helos*, a marsh, and *charis*, grace; the specific name *palustris* means marshy; like many wetland sedges, spike rush forms extensive rhizomes, and is beneficial in preventing erosion and building soil; however, the species is not available commercially, and would probably be most successfully propagated by root sprigs.

ERIOPHORUM L. - Cotton Grass

Common Characteristics

- Perennials, culms rounded or triangular.
- Blades either present, linear, or reduced to bladeless sheaths.
- Spikelets solitary or several.
- Flowers perfect, each subtended by a scale.
- Perianth of conspicuous elongate silky bristles, 6 per flower, each again 4-6 divided, these persistent, attached to achenes.
- Perigynia and tubercles on achenes absent.

Key to Eriophorum

1. Plants strongly creeping; spikelets commonly 2 or more; plants with leafy bracts. 2

Culms tufted, rhizomes/stolons absent; spikelets solitary; leafy bracts absent; culm leaves mostly reduced to bladeless sheaths. 3

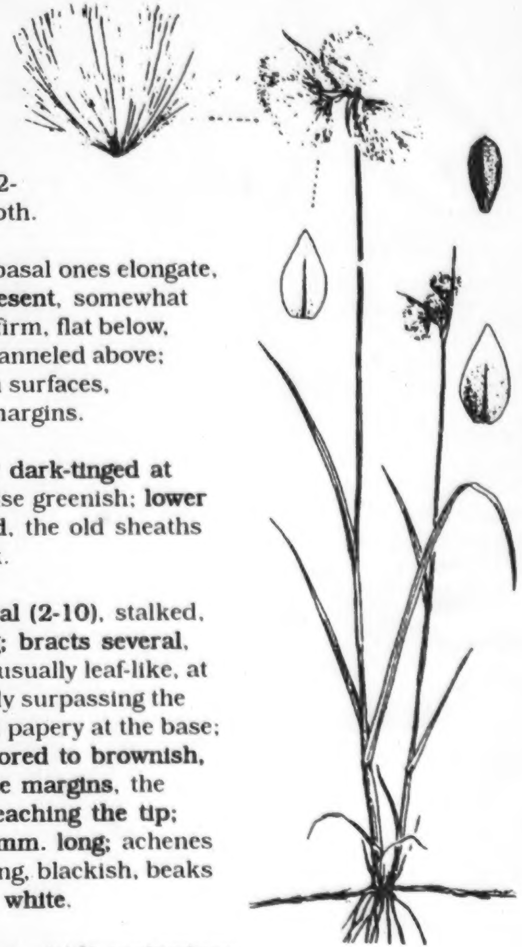
2. Upper sheaths dark at the apex; midrib of scales not reaching the tip; anthers conspicuous, 3-4 mm. long. *E. polystachion*

Upper sheaths not dark-tipped; midrib of scales extending to the tip; anthers 1-1.5 mm. long. *E. viridi-carinatum*

3. Lower scales spreading to the reflexed, with wide paler margins; bristles white; culms distinctly 3-sided; mostly in sphagnum bogs. *E. vaginatum*

Lower scales ascending, without wide whitish margins; bristles cream-colored; stems terete, not distinctly 3-sided; in more varied wet habitats. *E. brachyantherum*

Eriophorum polystachion L. - Tall Cotton Grass



Growth Habit: Plants from **stout creeping rhizomes**; culms nearly rounded, bluntly angled, 2-8 dm. tall, smooth.

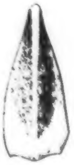
Blades: 2-6 mm. wide, basal ones elongate, **culm leaves present**, somewhat smaller; thick, firm, flat below, triangular to channeled above; smooth on both surfaces, roughened on margins.

Sheaths: Smooth, **upper dark-tinged at mouth**, otherwise greenish; **lower often red-tinged**, the old sheaths brownish, thick.

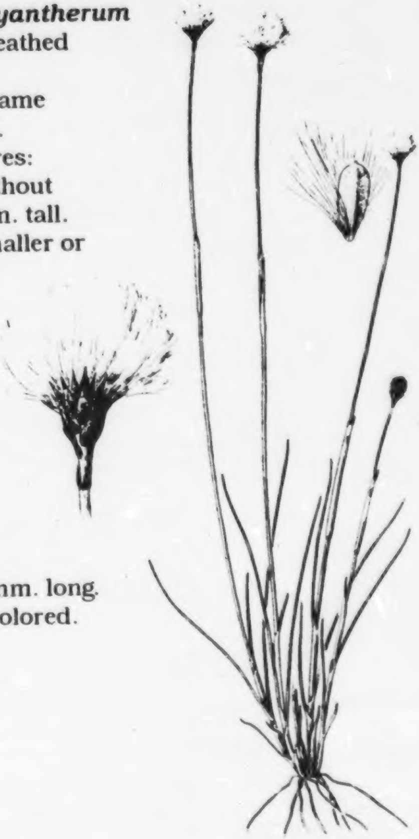
Heads: Spikelets **several (2-10)**, stalked, **often drooping; bracts several**, usually 2 or 3, usually leaf-like, at least one slightly surpassing the head, dark and papery at the base; scales **lead colored to brownish, with broad pale margins**, the **midvein not reaching the tip; anthers 2.5-5 mm. long**; achenes 2.5-3.5 mm. long, blackish, beaks short; **bristles white**.

Similar Species:

1. ***Eriophorum viridi-carinatum*** (Engelm.) Fern. - Thin-leaved Cotton Grass
   Found in similar habitats and has much the same distribution patterns.
   Differs as follows:
   - Midribs of scales extend to tip.
   - Upper sheaths not as consistently dark at the tip.
   - Anthers 1-1.5 mm. long.



2. ***Eriophorum brachyantherum*** Trautv - Close-sheathed Cotton Grass
Found in much the same regions and habitats.
Distinguishing features:
- Plants tufted, without rhizomes, 3-6 dm. tall.
- Upper blades smaller or reduced to 2 dark-tinged but not inflated sheaths.
- Spikes solitary.
- Scales green-blackish, their margins not paler.
- Achenes to 2.5 mm. long.
- Bristles cream-colored.



3. ***Eriophorum vaginatum*** L. ssp. ***vaginatum*** - Close-sheathed Cotton Grass
Common in the boreal forest. Found in bogs and marshes, sometimes in rather dry bogs. Especially common in sphagnum and more closely associated with these ecosites than the other listed species.
Differs as follows:
- Plants tufted, without rhizomes.
- Culms 3-sided.
- Blades more often scabrous on angles.
- Upper stem sheaths inflated, not distinctly dark-tinged.
- Scales with wide hyaline margins.
- Lower scales often reflexed.
- Achenes large (to 3.5 mm. long, the beaks 0.1-0.3 mm. long).

Habitat & Distribution: Common in the foothills and boreal forest Ecoregions, a disjunct population in the southern Rocky Mountains, also in Cypress Hills.

Found in muskegs, swamps, boggy areas.

Forage Value: Poor; although actual nutritional analysis of the genus as a whole is unclear, cotton grasses furnish relatively little forage, and as bog species, are often inaccessible to livestock.

Grazing Response: An increaser #I in areas where marshy places are frequently and heavily grazed.

Notes: Syn. *E. angustifolium*, meaning narrow, a reference to the narrow leaves; from the Greek *erion*, wool or cotton, and *phores*, bearing, alluding to the cottony spikelets; as extensively colonial species, cotton grasses have good soil binding properties, although they tend to inhabit quiet swamps and bogs rather than shores along moving water where erosion control is often more crucial.

SCIRPUS L. - Bulrush

Common Characteristics

- Perennials, culms rounded to triangular.
- Blades either elongate, leafy, or reduced.
- Spikelets solitary to numerous.
- Flowers perfect, each subtended by a scale.
- Perianth of 1-6 bristles, these usually inconspicuous.

Key to Scirpus

1. Densely tufted plants; culms rounded; spikelets single, terminal; outer scales with midrib prolonged as a blunt awn; of bogs and fens. *S. cespitosus*

Spikelets usually more than 1, lateral. 2

2. Cauline leaves mostly reduced; involucre bract solitary, not leaf-like, sometimes lacking. 3

Cauline leaves mostly well developed; involucre bracts at least 2, leaf-like. 5

3. Slender plants, culms sharply triangular; spikelets 1-5, sessile; achenes apiculate-pointed, not reticulate. *S. pungens*

Stout plants to 3 m. tall, sometimes aquatic, culms terete; spikelets in stalked umbellate clusters, numerous. 4

4. Culms soft; inflorescence loose and drooping; scales brown, ciliate; achenes to 2.2 mm. long. *S. validus*

Culms firm, stiff; inflorescence compact and not drooping; scales pale with red-brown stripes, more deeply laciniate; achenes 1.8-3 mm. long. *S. acutus*

5. Rhizomes without swollen nodes; sheaths reddish; spikelets 3-4 mm. long; inflorescence of many spikelets in drooping compound umbels. *S. microcarpus*

Rhizomes with tuber-like thickenings; spikelets large, 1-2.5 cm. long, rather few in dense heads; associated with highly alkaline/saline sites. *S. paludosus*

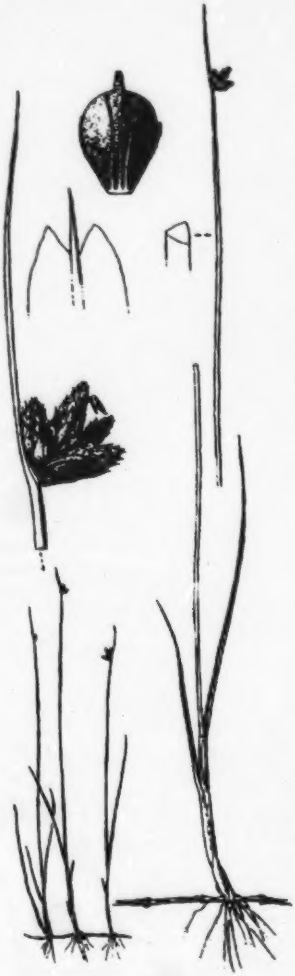
Scirpus pungens Vahl ssp. ***pungens*** - Three-square Rush

Growth Habit: Forming **elongate, brownish, firm rhizomes; culms 2-10 dm. tall,** arising singly or a few together, **sharply triangular**, smooth.

Blades: 2-4 mm. wide, elongate or reduced, borne near base, channeled to folded, smooth.

Sheaths: Smooth, veins prominent, **nodulose**, pale green above, **dark reddish-brown below**; somewhat concave at mouth.

Heads: Spikelets **1-6,** mostly sessile, **in a compact cluster, 7-20 mm. long; bract solitary**, appearing as extension of culms; scales dark reddish-brown, with midribs firm, **exserted** as a point **from notched tip**; bristles usually 4, mostly shorter than achenes; achenes lens-shaped, **abruptly short-pointed, not net-veined**; styles 2 or 3 branched.

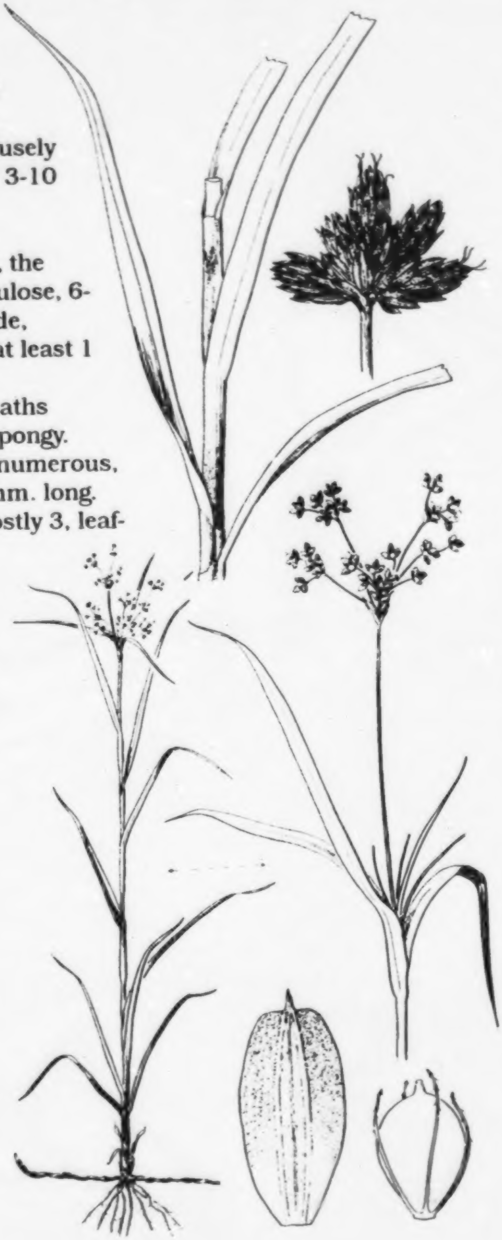


Similar Species:

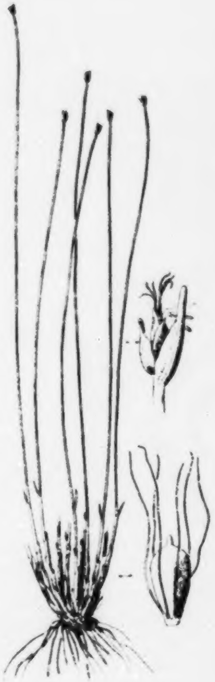
1. ***Scirpus microcarpus*** Presl. - Small-fruited Bulrush
Common, found in marshy places, on shores.

Distinguishing characteristics:

- Plants from stout rhizomes.
- Culms obtusely triangular, 3-10 dm. tall.
- Blades developed, the lower nodulose, 6-15 cm. wide, elongate (at least 1 dm.).
- Lower sheaths reddish, spongy.
- Spikelets numerous, only 3-6 mm. long.
- Bracts mostly 3, leaf-like.
- Achenes flattened, styles 2.



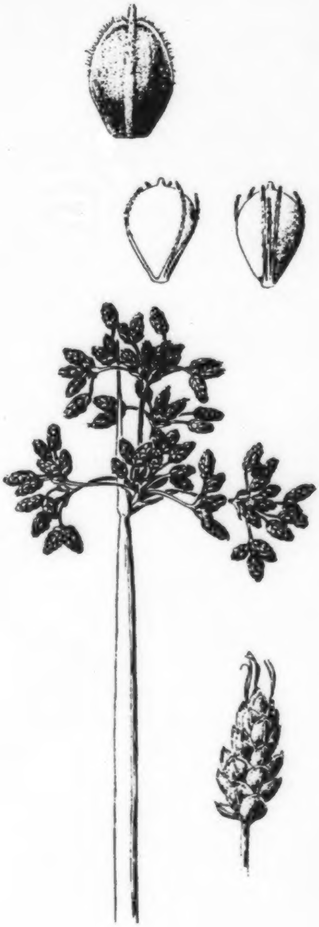
2. ***Scirpus paludosus*** A. Nels. - Prairie Bulrush
Frequent in the prairie and parkland regions, occasional in the north. Grows in wet places, usually on saline or alkaline soils. Tolerant of high alkalinity and an indicator of these ecosites.
Distinguishing characteristics:
   - Plants from rhizomes and also tuber-like thickenings.
   - Culms 2-10 dm. tall, sharply triangular.
   - Blades and bracts each several.
   - Spikelets 2-20 in a compact cluster.
   - Spikelets large, to 2 cm. long.
   - Scales hairy.
   - Achenes flattened, styles 2.
3. ***Scirpus cespitosus*** L. -
Tufted Bulrush
Found in boggy, often spring-fed places in the boreal forest/Rocky Mountain region. Locally abundant in some localities, an indicator of some graminoid-dominated fens.
Distinguished as follows:
   - Densely tufted plants, without rhizomes.
   - Basal sheaths bladeless, glossy, brownish, not shredding, very conspicuous.
   - Culms slender, rounded, smooth, wiry, 1-4 dm. tall.
   - Upper sheaths with green blades to 8 mm. long.
   - Spikes solitary, terminal, 4-5 mm. long, ovoid-oblong.
   - Scales brown, ovate, acute, the outer one (bract) with a short blunt awn shorter than or slightly longer than spikelet.
   - Bristles 6, mostly longer than achenes.
   - Achenes 1.5-2 mm. long, 3-sided, smooth, with a short point.



Habitat & Distribution: Common in the prairies, also frequent in parkland region and occasional in the foothills Ecoregion.
Found in wet places: around sloughs, in marshy places, on shores, frequently in sandy areas.
Tolerant of alkali, and often grows in depressional alkaline, brackish or moderately saline areas.

Forage Value:	Poor, nutritional status poorly documented, but the species rated as essentially worthless as a range plant, the stiff, wiry stems make the foliage unpalatable at all growth stages.
Grazing Response:	An increaser, usually left ungrazed, thus maintaining optimum vigor and reproductive capacity.
Notes:	Syn. *S. americanus*; *Scirpus* is the classical Latin name for rush or bulrush; also known as American bulrush; although smaller bulrushes received limited recognition by native people, *S. pungens* was apparently used to some extent in basket making; both this and the similar *S. nevadensis* are excellent species for erosion control in moist saline and alkaline sites where more desirable species will not establish, *S. pungens* also beneficial in binding loose sandy soil; as with most rhizomatous members of the Sedge Family, propagation by seed shows limited success, but many species are promising for vegetative reproduction by root sprigs.

Scirpus validus Vahl - Common Great Bulrush



Growth Habit: Plants with **stout, elongate brown/reddish-brown rhizomes**; culms **0.5-3 m. tall, rounded**, pale green, **soft and easily crushed**.

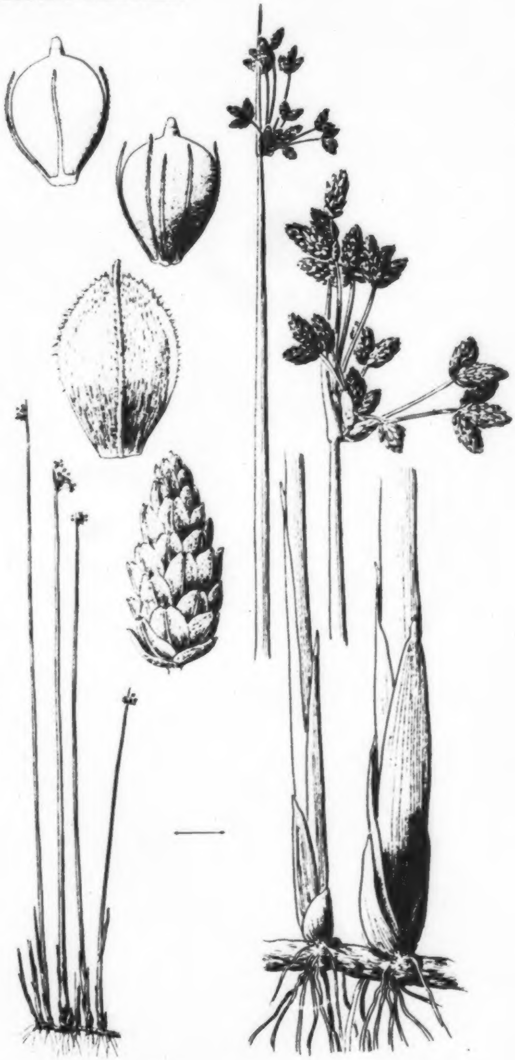
Blades: Mostly reduced, or sometimes elongate, borne on lower part of culm; longer blades flat, firm, smooth below, roughened on margins and often above.

Sheaths: Firm, well developed, smooth, **veiny**, the lower brownish, often with reduced blades.

Heads: Spikelets **to 1 cm. long, numerous, in a drooping inflorescence**; bract solitary, erect; scales 2.5-3 mm. long, hair-fringed, **not obviously lacerate-fringed**, reddish brown, the **reddish markings not as prominent as in *S. acutus***; tip **rounded to shallowly notched**, short-pointed; bristles usually 6, about as long as achenes; achenes 2-2.3 mm. long, **brown-olive brown**, flattened; styles 2-branched.

Similar Species:

1. ***Scirpus acutus*** Muhl. *ex.* Bigel. - Great Bulrush
   Found in much the same range and habitats as *S. validus*. Differs as follows:
   - Culms more firm.
   - Spikelets 8-20 mm. long, mostly in more compact, erect heads.
   - Scales more flecked with red-brown, their margins more deeply lacerate-fringed.
   - Top of scales notched, short-pointed.
   - Achenes darker-blackish.



Habitat & Distribution: Common and widely distributed.
A wetland species, found on shores, around sloughs, in marshy areas, on stream banks, often forming large colonies.
Tolerant of alkali.

Forage Value: Poor; although little specific nutritional analysis is available, large bulrush species are generally rated as inferior forage, having lower nutrient content and poor palatability; these species are, however, important in providing habitat for wetland wildlife.

Grazing Response: A decreaser; although from tough rootstocks and generally not grazed, large bulrush species seem sensitive to trampling; stands tend to decline in areas where water levels recede annually to allow livestock access.

Notes: Large bulrushes were used by native people in making various articles such as mats and baskets, also sometimes to build shelters; *S. validus* and *S. acutus* are valuable species for binding loose, wet soil along shorelines, and are recommended for revegetating such sites; propagation will most successfully be accomplished by transplanting root sprigs.

JUNCACEAE - Rush Family

Common Characteristics

- Grass-like plants, with rhizomes or tufted from fibrous roots.
- Leaves either reduced, scale-like, or elongate and rounded or flat, 3-ranked, mostly hairless, margins smooth.
- Sheaths open or closed.
- Flowers few to many, in contracted or somewhat open terminal heads.
- Flowers perfect, perianth present in two whorls (3 petals, 3 sepals), the segments similar, scale-like.
- Stamens 3 or 6, stigmas 3.
- Fruit a capsule with 3 to many seeds.

Key to Juncaceae

1.	Leaves grass-like, flat, with at least some hairs; capsules with 3 seeds.	*Luzula*
	Leaves terete, often septate-nodulose (occasionally more grass-like), glabrous; capsules with numerous smaller seeds.	*Juncus*

JUNCUS L. - Rush

Common Characteristics

- Plants annuals, or more often perennials, sometimes rhizomatous.
- Leaves hairless, channeled, rounded to flat, often reduced.
- Cauline leaves with open sheaths.
- Flowers as described.
- Capsules with numerous, very small seeds.

Key to Juncus

1. Inflorescence positioned at the side of the stem, the stem appearing as a cylindrical bract, extending beyond inflorescence; blades absent; plants dark green, wiry. *J. balticus*

   Inflorescence either at side of stem and bracts flattened, or terminal; blades often present. 2

2. Plants annual; inflorescence at least 2/3 of plant height, branching and diffuse. *J. bufonius*

   Plants perennial. 3

3. Leaves iris-like, flattened laterally, flattened edgewise to stems (equitant), 3-6 mm. wide. 4

   Leaves not as above, terete or flattened with surfaces facing stems, to 3 mm. wide. 5

4. Leaves to 6 mm. wide, auricles small; styles not exserted, 1 mm. long; seeds about 0.5 mm. long, minutely pointed. *J. ensifolius*

   Leaves to 4 mm. wide, auricles prominent; styles exserted, more than 1 mm. long; seeds 0.8-1 mm. long, with tails at each end. *J. tracyi*

5. Leaves essentially terete, septate (with nodulose partitions). 6

   Leaves channeled, flattened, not septate. 7

6. Inflorescence congested, greenish-brown, the branches short, the flowers spreading, giving a prickly appearance. *J. nodosus*

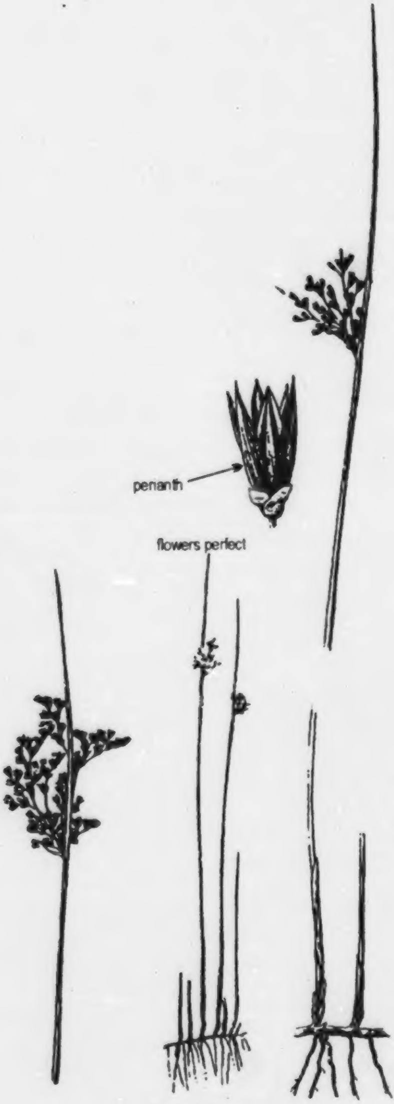
   Inflorescence more elongate, darker brown, the flowers ascending-erect. *J. alpinoarticulatus*

7. Leaves flattened, grass-like; flowers in congested heads; perianth segments dorsally roughened. *J. longistylis*

   Leaves not distinctly grass-like; inflorescence of flowers borne singly in panicles or racemes; perianth not roughened. 8

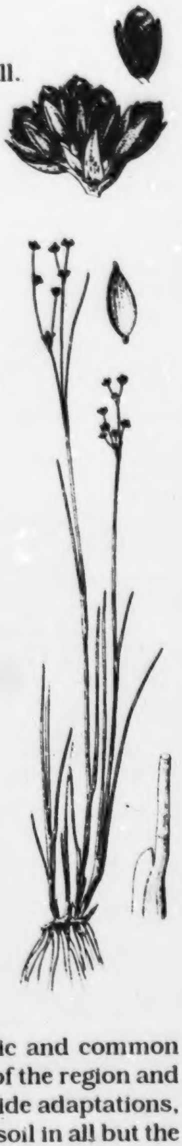
8. Blades very narrow, to 1 mm. wide; perianth segments 3.5-4 mm. long, with a dark stripe on either side of midrib; capsules 3-celled; seeds oblique at each end. *J. confusus*

   Blades often broader, 0.5-1.5 mm. wide; perianth segments often more than 4 mm. long, without conspicuous stripes along midrib; capsules 1-celled; seeds not abruptly oblique on ends. *J. tenuis*


perianth
flowers perfect

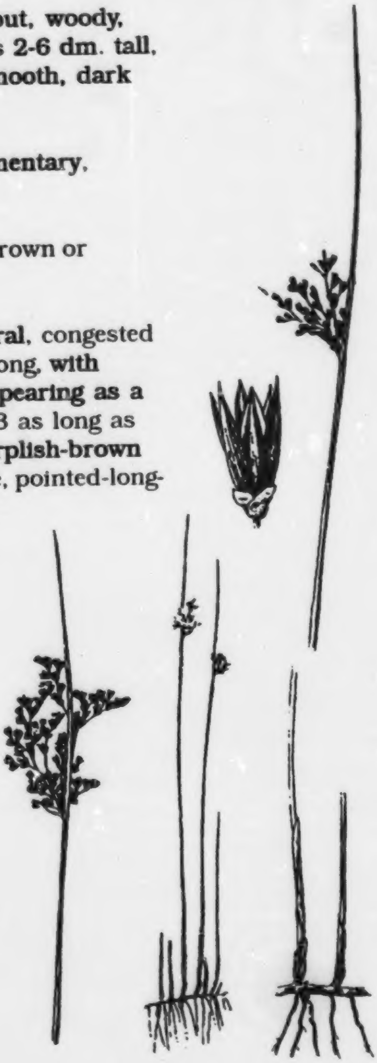
Juncus balticus

Juncus alpinoarticulatus Chaix - Alpine Rush



Growth Habit:	Plants caespitose in small tufts from creeping rhizomes; stems erect or somewhat reclining (sometimes rooting at the nodes), 1.5-4 dm. tall.
Blades:	Blades 1-3 per stem, auriculate, terete and **septate**.
Sheaths:	Sheaths with hyaline margins, often tinged with pink-purple, especially towards base.
Heads:	**Inflorescence 2-15 cm. long, the branches ascending**; heads 4-30, each 3-10 flowered, **both terminal and lateral**; flowers sessile to short-stalked; **perianth segments purple-brown, often dark**, 2-2.5 mm. long, **mostly obsuse** (outer sometimes acutish-short-pointed); **anthers shorter than filaments**; some flowers sometimes elevated on short stalks above the others; capsules ovoid-oblong, **pale brown, as long as to slightly exceeding the perianth**, obsuse to short-pointed, incompletely 3-celled; seeds spindle-shaped, lightly ridged, pointed at each end, about 0.5 mm. long.
Habitat & Distribution:	Rather common and widespread, absent from the dry prairie region. Found in wet meadows, on sandy and gravelly shores. Often on calcareous soils.
Forage Value:	Poor to fair, generally moderately palatable, but furnishing relatively little forage unless dense populations occur.
Grazing Response:	An increaser.
Notes:	Syn. *J. alpinus*; contrary to both its scientific and common names, alpine rush occurs throughout much of the region and at varying altitudes; because of these rather wide adaptations, it is of particular value in stabilizing loose wet soil in all but the driest Ecoregions; tolerance of alkaline soils is moderate, but that of saline and highly alkaline conditions is low.

Juncus balticus Willd. var. *montanus* Engelm. - Baltic Rush



Growth Habit: Perennial **with extensive, stout, woody, dark brown rhizomes**; culms **2-6 dm.** tall, usually **solitary, rounded, smooth, dark green, wiry**.

Blades: **Absent, or sometimes rudimentary**, appearing as a short point.

Sheaths: Basal, loose, tawny to dark brown or reddish-brown.

Heads: Inflorescence **appearing lateral**, congested to somewhat open, 2-4 cm. long, **with numerous flowers; bract appearing as a continuation of stem**, 1/5-1/3 as long as stem; perianth segments **purplish-brown** with pale margins, lanceolate, pointed-long-pointed, 4-5 mm. long; anthers to 2.2 mm. long, much longer than filaments; capsules equalling to slightly longer than perianth, short-pointed; seeds averaging 0.6 mm. long, abruptly short-pointed.

Related Species:

1. Var. ***littoralis*** Engelm.
   - Generally larger, with flowers very numerous in an open inflorescence 4-8 cm. long.
2. Var. ***vallicola*** Rydb.
   - Differs in having outer perianth segments long-pointed, much longer than inner pointed whorl.

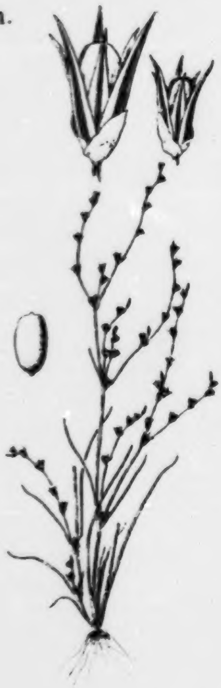
Habitat & Distribution: Very common throughout most regions.
Found in moist to wet habitats: on shores, in depressional grassland, in sandy areas with a high water table.
Tolerant of moderate alkaline and saline conditions.

Forage Value: Fair, protein content comparable to that of many range grasses; plants are palatable early in the season, regrowth also readily eaten, but are usually avoided by livestock when they dry or after frosts; Baltic rush can make fairly palatable but light hay if cut early and properly cured.

Grazing Response: An increaser, due to both relatively low palatability and the aggressive and extensive root system that resists heavy trampling and spreads when other species decline.

Notes: *Juncus* is the classical Greek term for rush; the specific name *balticus* as well the common name are used because the species is especially abundant on the shores of the Baltic Sea; also known as wire rush; *J. balticus* was used by the Blackfoot people to obtain a brown dye, also by other native groups to make mats and baskets; Baltic rush has excellent soil binding properties and is important for erosion control on shores and in loose sandy soil.

Juncus bufonius L. - Toad Rush



Growth Habit: **Annual**, with fibrous roots; culms 2-20 cm. tall, tufted, **filiform, spreading**, smooth.

Blades: To 1.5 mm. wide, 5-10 cm. long, flat to inrolled, **few, fine**, basal, smooth.

Sheaths: Membranous on margins, often rounded to truncate at apex.

Heads: **Inflorescence very diffuse, freely branching, usually at least 2/3 the plant height**, flowers solitary or in 2's or 3's; bracts subtending flowers in pairs, hyaline, 1-2 cm. long; perianth segments 2-7 mm. long, **pale to greenish or pale brown**, the outer lanceolate-acuminate, inner more obtuse, **margins broadly scarious**; stamens 6, anthers from shorter to equalling filaments, capsules subglobose-oblong, shorter than perianth, obtuse, mucronate; seeds short-pointed to truncate at both ends.

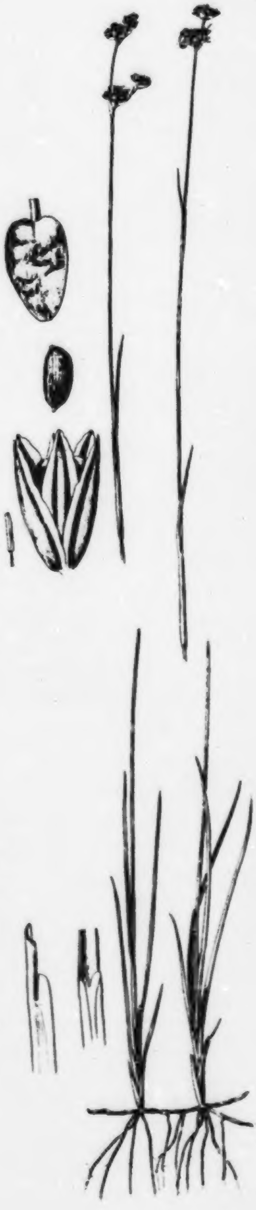
Habitat & Distribution: Common in all regions.
Found in wet places, on shores, on wet mud flats, around sloughs and dried pools.

Forage Value: Fair, palatable, but production is low except when exceptionally dense, healthy stands occur.

Grazing Response: An increaser; typical of most annuals *J. bufonius* is adapted to produce an abundance of viable seed, some of which is below normal grazing level and unless grazing pressure is excessive, populations are usually maintained.

Notes: *Bufonius* translates toad, probably (along with the common name) alluding to the typical wetland habitat of the species; *J. bufonius* plays an important role as an early sucessional annual, stabilizing wet disturbed soil until perennial species establishment; as an annual, populations can fluctuate in relationship to the dynamics of occasional / seasonal shoreline flooding.

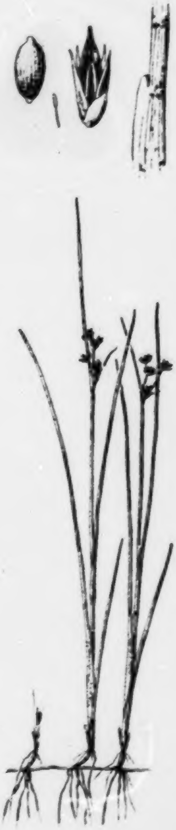
Juncus longistylis Torr. - Long-styled Rush



Growth Habit:	Loosely tufted **from strong rhizomes**; stems somewhat flattened, **2-6 dm. tall**.
Blades:	**Blades grass-like, pale green, the lower flat, the upper flat to inrolled, 1.5-4 mm. wide, not septate-nodulose**.
Sheaths:	Sheaths with scarious margins, prolonged into truncate to rounded auricles 1-2 mm. long; lower sheaths brown-dark brown.
Heads:	**Flowers in distinct 3-8 flowered heads**, these 1-8 per culm, separated to somewhat aggregated; bract membranous, 1-2 cm. long; perianth segments 5-6 mm. long, broadly lanceolate, **often minutely roughened**, brown and with a broad green midvein and **broad scarious margins; styles elongate**; stamens 6; capsules oblong, rounded-truncate, **abruptly long-beaked**; seeds obliquely oblong, 0.4-0.5 mm. long, ribbed, **minutely pointed at each end**.
Habitat & Distribution:	Common in all Ecoregions except the boreal forest. Found at low elevations, into montane areas. Grows in wet meadows, on sandy and gravelly shores.
Forage Value:	Fair, palatable to most ungulates, also fairly nutritious, but often providing little forage.
Grazing Response:	An increaser, usually capable of maintaining stands due to strong rhizome growth.

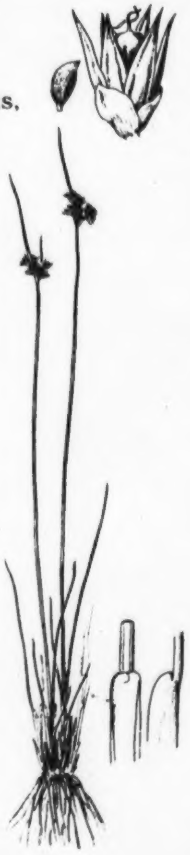
Notes: Both the specific and common names allude to the elongate styles characteristic of the species; *J. longistylis* contributes significantly to the stabilization of loose wet soil along waterways, also establishes quickly via root fragments following mechanical disturbance and flooding.

Juncus nodosus L. - Knotted Rush



Growth Habit:	Perennials from fine brownish rhizomes, **with tuber-like thickenings from which culms arise**; culms solitary, 1-4 dm. tall, rounded.
Blades:	About 1 mm. wide, elongate, **terete and prominently septate-nodulose**, both basal and cauline, the upper exceeding the inflorescence.
Sheaths:	Greenish with scarious margins, the lower often pale and suffused with pinkish-purple; **septate-nodulose**; upper portion projecting into rounded auricles about 1 mm. long, these firm but membranous.
Heads:	Inflorescence 5-6 cm. long, with several many-flowered heads, **these less than 10 cm. wide, spherical, the flowers spreading-reflexed, giving a prickly appearance**; bract single, terete, exceeding the inflorescence; **perianth segments 3-4 mm. long, greenish-brown-tawny**, narrow-lanceolate, acuminate; stamens 6; capsules tapering into long beaks that exceed perianth; seeds finely reticulate, pointed.
Habitat & Distribution:	Common throughout most regions. Found in moist to wet areas: around sloughs, in marshy and boggy areas, on shores, in wet ditches.
Forage Value:	Fair to good, palatable to both domestic and wild ungulates, but in most cases rather marginally productive.
Grazing Response:	An increaser.
Notes:	The term *nodosus* as well as the common name are references to both the knotted, tuber-like plant bases and the nodulose thickenings on blades; as with other rhizomatous rushes, *J. nodosus* has considerable soil binding ability along water courses where flooding and often livestock concentrations and consequently soil disturbance can be expected.

Juncus tenuis Willd. var. ***dudleyi*** (Wieg.) Hermann - Slender Rush



Growth Habit: **Caespitose, without rhizomes**; culms 1.5-6 dm. tall, slender, terete, smooth.

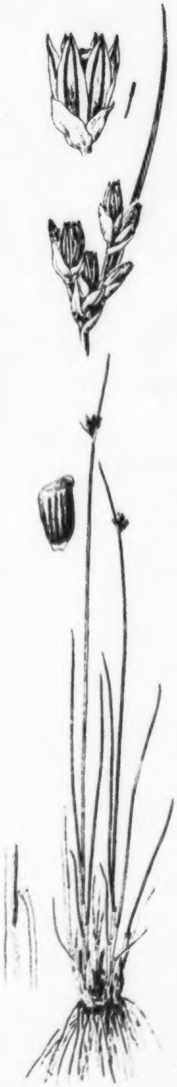
Blades: **0.5-1.5 mm. wide**, usually shorter than culms, clustered at base of culms, flat, **not septate-nodulose**, smooth.

Sheaths: Greenish-yellow, sometimes suffused with pink, **projecting into distinct auricles at apex, these firm, yellowish, not prolonged, short, rounded**.

Heads: **Inflorescence 1-3 cm. long, usually congested**; bracts 1-3, at least one surpassing the head; perianth segments 3-5 mm. long, **lanceolate, often awl-shaped, greenish to tawny, with green midrib, sometimes suffused with purple along sides and at tip**, margins hyaline; **capsules consistently shorter than perianth**, ovoid-oblong, **somewhat 3-angled, sometimes obscurely retuse at apex, one-celled, greenish-olive** to tawny; seeds ovoid-ellipsoid, **not abruptly oblique**, very minutely pointed.

Related Species:

1. Var. ***multicornis*** E. Mey
   Differs as follows:
   - Auricles more prolonged, whitish-membranous.
   - Inflorescence more open, usually more than 3 cm. long.



Similiar Species:

1. *Juncus confusus* Coville - Few-flowered Rush
   Scattered in southern regions.
   Found in depressional grassland, in open woods.
   Differs as follows:
   - Blades very narrow, to 1 mm. wide.
   - Auricles membranous but rounded, short, to 1 mm. long.
   - Inflorescence fewer flowered, 1-2 cm. long.
   - Perianth segments blunt to acute, not long-acuminate, with darker brownish stripes on either side of midrib.
   - Capsule bronze, almost the length of perianth, distinctly retuse, more evidently 3-angled, and completely 3-celled.
   - Seeds distinctly longitudinally ridged, and obliquely cleft at ends.

Habitat & Distribution: Common throughout most regions. Found in wet to moist places: on shores, in marshy places, in moist and depressional grassland.

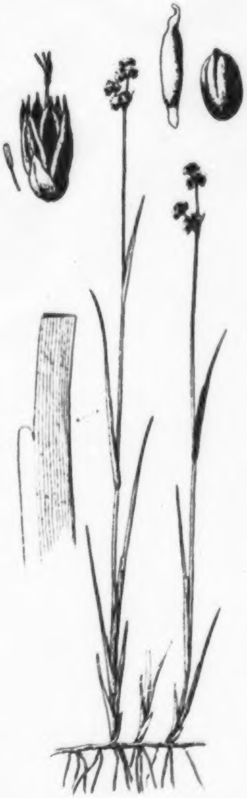
Forage Value: Poor, considered less palatable than many members of the genus, grazed primarily when choice forage is scarce.

Grazing Response: An increaser.

Notes: The primary value of this and similar species lies in their contributions both to overall species diversity and in stabilizing wet shoreline soil; as well, protection of these populations will positively impact the larger and more crucial issues of preservation of our sensitive riparian habitats; *J. tenuis*, in particular, has a rather wide range of adaptations; small quantities of plant material are now available in some nurseries and greenhouses.

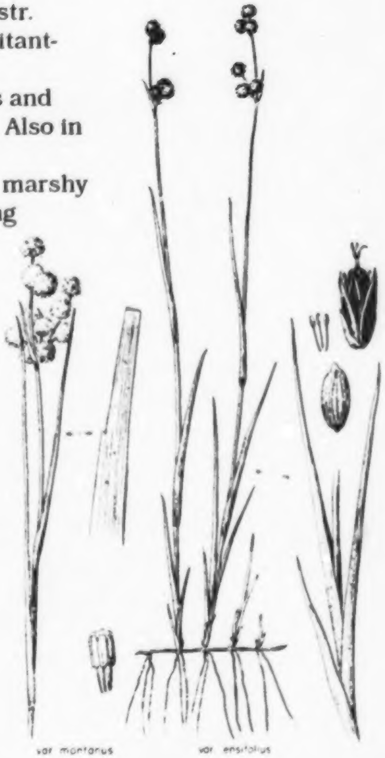
Juncus tracyi Rydb. - Mud Rush

Growth Habit:	Perennials **from stout creeping rhizomes; stems 3-6 dm. tall, compressed and two-edged.**
Blades:	**Leaves flattened laterally, positioned edgewise to stems (equitant), partially septate,** 1-3 per stem, **2-4 mm. broad.**
Sheaths:	Pale to purple-tinged, **the margins conspicuously pale-scarious, prolonged into evident auricles.**
Heads:	Inflorescence a panicle of 3-9 heads, these 10-15 mm. wide, many-flowered; **bracts short, inconspicuous; perianth segments 3-4 mm. long, acuminate, dark purple-brown; stamens 6,** the anthers from just shorter to slightly longer than filaments; **styles more than 1 mm. long, distinctly exserted**; capsules slightly shorter than perianth, blunt, short-pointed; seeds 0.8-1 mm. long, **short-tailed at each end.**



Similar Species:

1. ***Juncus ensifolius*** Wikstr. var. ***ensifolius*** - Equitant-leaved Rush
   Common in the foothills and Rocky Mountain region. Also in Cypress Hills.
   Found in wet meadows, marshy and springy places, along streams.
   Differs as follows:
   - Blades often broader, to 6 mm. broad.
   - Auricles not evident or at least smaller.
   - Sheath margins scarious but less conspicuously so.
   - Bracts conspicuous, about ½ the length of the inflorescence.
   - Perianth segments pale green-brown to deep brown, not as sharply acuminate.
   - Stamens 3, anthers shorter than filaments.
   - Styles to 1 mm. long, shorter than perianth.
   - Seeds 0.5 mm. long, only minutely pointed at each end.



Habitat & Distribution: Common in the foothills/Rocky Mountain region, in Cypress Hills, and in a few localities in the southern boreal region, found from low to subalpine elevations.
Grows in wet, springy places, in swampy meadows and woods, along streams.

Forage Value: Fair to good, members of the group generally readily grazed by both livestock and game from spring until freeze-up; healthy populations can be fairly productive, and are sometimes a component of native hay.

Grazing Response: Increasers in most regions.

Notes:

Both *J. tracyi* and *J. ensifolius* are similar to other rhizomatous rushes in their soil binding abilities, and as the name *ensifolius* (iris-like) suggests, have ornamental potential, more because of their attractive foliage than their floral characteristics; small amounts of plant material are currently available, although, as is the case with many greenhouse species, genetic origins are not always from local native varieties.

LUZULA DC. - Wood Rush

Common Characteristics

- Low, tufted perennials, sometimes rhizomatous.
- Leaves grass-like, flat to channeled, often hairy on the margins, mostly basal.
- Sheaths closed.
- Cymes few-many flowered, sometimes spike-like, or in a more open panicle-like arrangement.
- Flowers subtended by bractlets, these toothed to lobed.
- Perianth green to brown, often scarious.
- Stamens 6.
- Capsules 1-celled, 3-seeded, seeds sometimes basally attached by cottony fibers or by a fleshy appendage (caruncle).

Key to Luzula

1. Plants 3-6 dm. tall; inflorescence nodding, with 1-2 flowers at the end of each branch. *L. parviflora*

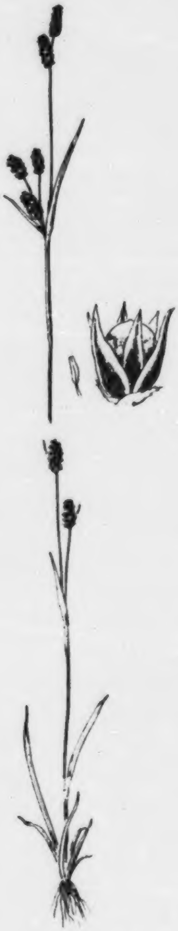
Flowers more numerous per cluster, these densely crowded. 2

2. Involucre bract shorter than inflorescence ; inflorescence arching, heads crowded, spike-like; mostly alpine. *L. spicata*

Involucre bract often exceeding inflorescence; inflorescence erect, subumbellate, with 8-15 flowers in somewhat open to dense clusters; widespread. *L. multiflora*

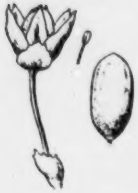
Luzula multiflora (Retz.) Lej. ssp. *multiflora* - Field Wood Rush

Growth Habit:	Densely tufted plants, culms somewhat bulbose-based, 2-6 dm. tall.
Blades:	Leaves 2-6 mm. wide, mostly basal, the cauline 2-4; blades sparsely to moderately long-hairy on margins, especially below and along sheath margins.
Heads:	Flowers crowded into small, erect clusters of about 8-15 flowers per cluster, these somewhat umbellate, the glomerules either open on elongate flower stalks, or congested and subsessile; involucre bract elongate, often longer than the inflorescence; perianth segments 2.5-3 mm. long, pale to deep brown, with hyaline margins; capsules ovoid, about as long as perianth; seeds 1.5-2 mm. long, with a white, spongy basal appendage.

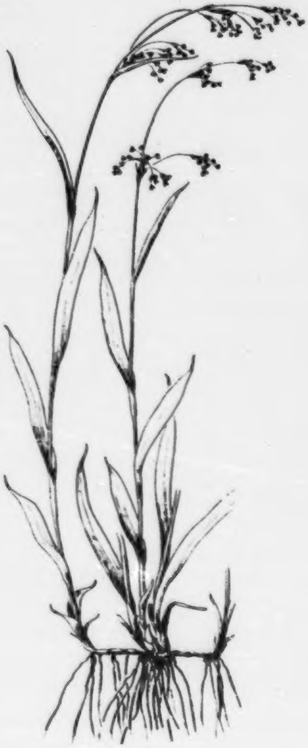


Similar Species:

A number of our species are either uncommon, or restricted to higher elevations. Two more common species:



1. ***Luzula parviflora*** (Ehrh.) Desv. - Small-flowered Wood Rush
   Found in moist woods and thickets, in low meadows. Common in the foothills and Rocky Mountain regions with some occurrences in the boreal forest.
   Distinguishing features:
   - Plants 3-6 dm. tall from elongate rootstocks.
   - Cauline leaves 4 or more, glabrous except at base.
   - Inflorescence nodding on slender branches, the flowers solitary or in pairs.
   - Perianth small (1.8-2.5 mm. long).
   - Bracts entire to slightly lacerate but never hair-fringed.
   - Anthers less than 1 mm. long.
   - Capsules elliptic-rounded, less than 2.5 mm. long.
   - Seeds not appendaged.

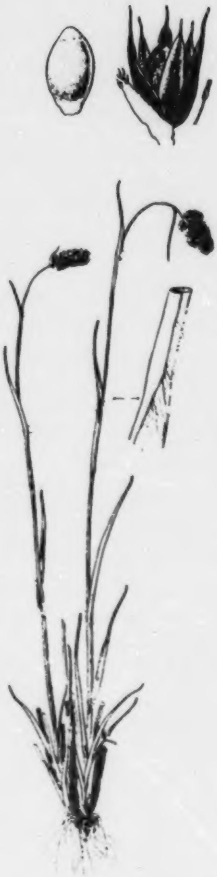


2. ***Luzula spicata*** (L.) DC. - Spiked Wood Rush

An alpine species, found in the Rocky Mountain region. Grows on alpine tundra, on rocky slopes.

Differentiated from *L. multiflora*:

- Plants smaller (1-3 dm. tall).
- Inflorescence arched-nodding.
- Glomerules crowded to somewhat interrupted, dense and spike-like.
- Involucre bracts much shorter than inflorescence.
- Flowers more consistently darker brown.



Habitat & Distribution: Scattered throughout except absent from prairie and parkland regions. Grows in moist meadows and damp woodlands. An indicator of rich, moist willows/sedge/tufted hair grass meadows in western regions.

Forage Value: Poor to fair, variation in palatability of the genus as a whole usually dependent on availability and abundance of choice forage.

Grazing Response: Increasers, rarely decreasers in some localized situations where utilization is exceptionally heavy.

Notes: The name *Luzula* is apparently derived from the ancient Latin *Gramen Luzulae*, a reference to the lustrous or glossy appearance of the foliage when wet; wood rushes can superficially resemble and thus be mistaken for grasses; upon close examination, however, they can be appreciated as rather unique and attractive woodland plants and as contributing to the biological diversity of the areas they inhabit.

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Glossary

abaxial:	On the side away from the axis.
achene:	A small dry, indehiscent, 1-seeded fruit with a thin wall.
acuminate:	Gradually tapered to a long, slender point.
adaxial:	Turned toward the axis.
alternate:	Situated singly (not opposite) on a stem, or placed regularly between organs of another kind (stamens alternate with sepals).
ament:	A dense spike or raceme with small, naked or apetalous, mostly unisexual flowers; catkin.
androecium:	Stamens considered collectively.
angiosperm:	Flowering plants (*Magnoliophyta*), containing ovules enclosed in an ovary.
anther:	Pollen-bearing part of a stamen, usually consisting of 2 pollen sacs and connecting tissue.
anthesis:	The time of full flower expansion and functioning of reproductive structures.
apetalous:	Lacking petals.
aphyllopodic:	Lowest leaves reduced, scale-like, the first true blades appearing well above the plant base.
appressed:	Lying flat against another organ.
aquatic:	Living in water.
areolae:	Small, defined areas on a surface.
articulate:	Jointed, the joint the point of ultimate separation.
ascending:	Sloping upward at an oblique angle.
auricles:	Small, ear-shaped appendages such as those at the base of a leaf.
awl-shaped:	Gradually tapering from the base to a slender rigid point.
awn:	A bristle-like, usually terminal appendage.
axil:	The upper angle formed by a leaf or petiole with the stem.
axillary:	Situated in or arising from an axil.
banner:	The upper, usually enlarged petal in a papilionaceous flower.
barbed:	Having short, stiff, pointed, bristly, often reflexed hairs.
basal:	Located at the base of an organ or plant.
beak:	An elongated, usually slender tip on organs such as fruits or seeds; not applied to flat organs (leaves).
berry:	A fleshy or pulpy fruit formed from a single pistil, having 1-many seeds, a fleshy ovary wall and a thin outer skin.
biennial:	Plants completing their life cycle in two years, usually only flowering in the second year.

bilabiate:	Two-lipped (applied to perianth segments).
blade:	The flat, expanded part of a leaf or petal.
bract:	A reduced/modified scale or leaf subtending a flower or flower cluster.
bractlet, bracteole:	A very small bract; bracts borne on a petiole instead of subtending it.
bud:	An undeveloped flower, leaf or stem, vegetative buds usually covered by small modified leaves (bud scales).
bulb:	A short, thick underground bulb covered by fleshy modified leaves or leaf bases functioning as food storage organs.
bulblet:	A small new bulb arising beside a parent bulb; also refers to structures produced by some plants in axils, sometimes replacing flowers, functioning as a vegetative reproductive structure.
caespitose:	Densely tufted plants.
calcareous:	Lime-rich (calcium carbonate).
callus:	A firm thickening, as on the base of lemmas in grasses.
calyculate:	Having a set of small bracts around the calyx, or in *Compositae*, around the involucre, giving the appearance of an outer calyx.
calyx:	Referring to the sepals collectively.
capsule:	A dry, dehiscent fruit composed of more than 1 carpel (compound ovary).
carinate:	Keeled.
carpel:	The fertile unit of an angiosperm having stigma, style and ovary. Pistils are composed of 1-several carpels.
caryopsis:	The fruit of grasses, with the pericarp adnate to the seed (unlike achenes).
catkin:	See ament.
caudex:	A short, vertical, thick and sometimes woody stem base of perennial herbs, at or just below soil surface. Produces new annual growth, and can surmount a taproot or rhizome.
caulescent:	Leafy stems, with evident internodes.
cauline:	Situated on or pertaining to a stem.
chaff:	Thin, dry scales, as in bracts in composite flowers.
ciliate:	With a fringe of marginal hairs.
clasping (leaves):	The base partially or completely surrounding the stem.
claw:	Narrowed, stalk-like base of a petal or sepal.
cleft:	Divided to about the middle ("lobed" meaning more shallowly divided, "parted" more so).
cleistogamous (flower):	Setting seed without opening.
climax plants:	The original, stable vegetative community that develops throughout time on a specific soil and specific climate.
collar:	The band at the outer side of a grass leaf at the junction of sheath and blade.
colonial:	Plants forming colonies, connected underground by rhizomes.

complete (flowers):	Having calyx, corolla, and functional male and female organs (androecium and gynoecium).
compound leaf:	Composed of two or more distinct leaflets.
cone:	Sporophylls or ovuliferous scales clustered on an axis.
conical:	Cone-shaped.
connate:	Grown together or attached.
connective:	The tissue connecting two pollen sacs of an anther.
connivent:	Converging, but organs not actually united.
continuous (collar):	Extending from one sheath margin to the other.
cordate:	Heart-shaped, the apex pointed, the base rounded.
corm:	A short, vertical, thickened underground stem, functioning in food storage (more solid and without thickened leaves as in bulbs).
corolla:	Referring to the petals collectively.
corona:	Modified portions of the corolla or androecium appearing as small appendages between the corolla and androecium.
corymb:	A flat-topped inflorescence with outer pedicels progressively lengthened, the marginal flowers blooming first.
corymbose:	Arranged in a corymb.
cotyledon:	A leaf of an embryo of a seed.
creeping:	Growing along or below the ground surface and rooting at the nodes.
crenate:	Toothed with rounded teeth.
crested:	Having a projection or appendage on the summit.
crisped:	Irregularly wavy/curled (referring to leaf margins, hairs).
crown:	The base of a herbaceous perennial from which both roots and leafy growth are produced; the appendages in corolla throat; the leafy top of a tree.
cruciform:	Cross-shaped.
culm:	The stem of grasses, sedges and rushes.
cuneate:	Wedge-shaped.
cyme:	A flat-topped or convex inflorescence with the terminal (central) flower of each cluster blooming first.
deciduous:	Falling away at the completion of its function at the end of the season.
declined:	Obliquely curved downward.
decurrent:	Wings or margins (usually of leaves) extending down and adnate to the axis below the point of insertion.
deflexed:	Abruptly bent downward.
dehiscent:	Opening at maturity along a definate line.
digitate:	A compound leaf with leaflets arranged finger-like, radiating from a single attachment point.
dioecious:	Unisexual, the male and female reproductive structures on separate plants.

disarticulating:	Separating at a joint.
disc:	Generally, the enlarged flower receptacle; in composites, the central portion of a head, having tubular flowers.
discoid:	Resembling a head; in composites, referring to heads containing only tubular flowers.
dissected:	Deeply divided (below the middle) into narrow and usually several segments.
distichous:	In two vertical rows.
distinct:	Not united with adjacent similar organs.
divaricate:	Widely spreading and divergent from the axis.
divided:	Cleft to or below the midrib; in grasses, refers to collars separated by the midrib.
dorsal:	Referring to the back or outer surface of an organ; abaxial.
drupe:	Fruits similar to berries, having a fleshy middle ovary wall and thin outer skin but differing in that the inner ovary wall is hardened and bony (stone) enclosing 1-2 seeds.
druplet:	A small drupe (i.e. raspberry), usually one of a cluster.
early successional:	Pioneer plant species that are the first to establish on a disturbed site. These are native species usually also present in the climax vegetation, but decline in prominence as the natural plant succession allows climax species to establish.
emarginate:	With a small notch at the apex.
epigynous:	Perianth and stamens attached to the top of the ovary.
equitant:	Having edges rather than the surface facing the stem.
evergreen:	Leaves that remain green and attached throughout the winter.
excurrent:	The central axis continuing through and exserted as a short point.
exserted:	Extending beyond the surrounding organs.
farinose:	Covered with a white-mealy powder.
fascicle:	Arranged in a close cluster, usually referring to like organs.
fertile:	Capable of producing viable spores or seed.
fibrillose:	Having many slender fibers; shredded because of disintegration of thin tissue between persistent veins.
filament:	The lower stalk-like portion of a stamen.
filiform:	Very narrow and fine.
flaccid:	Weak and lax, not able to support its own weight.
fleshy:	Thickened and succulent, juicy.
floret:	A small flower, often one of a larger cluster as in grasses or composites.
follicle:	A dry pod-like fruit derived from a single carpel, splitting along the ventral side.
forage value:	The worth of a plant for ungulates depending upon a number of factors in combination: nutritional quality, palatability, quantity of forage produced, longevity, and primary distribution patterns. Forage value of

	a given species can vary from one location to the next, also depends upon class of livestock using the plants and season of use.
forbs:	Primarily broad-leaved flowering plants with net-like veins. For the purposes of simplifying identification, the category can be broadened to include those parallel-veined plants with brightly colored flowers (orchids, lilies, etc.).
gamopetalous:	Petals connate towards the base.
gametophyte:	The generation having "n" chromosomes and produces reproductive structures (gametes). Gametophytes in angiosperms are the embryo sac and pollen grain.
gibbous:	Abruptly swollen on one side, typically at the base of perianth.
glabrous:	Lacking hairs.
gland:	Small secreting structures either protruding, stalked or depressed, producing volatile oils or nectar which is often greasy or sticky.
glandular:	Having glands.
glaucous:	Covered with a fine waxy powder giving a white or bluish color.
glomerules:	Densely compacted clusters or heads.
glume:	One of the two empty (flowerless) bracts subtending a grass spikelet.
grain:	The fruit of grasses. See caryopsis.
grasses:	Plants which have hollow, jointed stems and leaves in two rows (ranks). Flowers are usually perfect, seeds borne between two scales (palea and lemma).
grass-like:	Plants that have narrow, parallel-veined leaves and resemble grasses. Stems are solid, often triangular and not jointed. The group includes, primarily, the sedge and rush families, and strictly speaking, can also include other monocots such as arrow-grass, lilies, etc.
grazing response:	The reaction of a plant species when it is grazed. This over-all response varies also with soil, climate and habitat. The following groups are recognized: I. **Invader:** Primarily non-native plants which invade and replace the existing vegetation when it dies back, shows reduced vigor, or is eliminated due to disturbance and overgrazing. These species may or may not have grazing value. II. **Decreaser:** Plants that are major components of the original climax vegetation community. They tend to be highly productive but decline under heavy grazing pressure in prominence and vigor due to high palatability and often inferior reproductive capacity. III. **Increaser:** Native plants that increase in prominence and vigor and replace decreaser species when they decline. They tend to be less productive, less palatable, and often have superior reproductive adaptations. IV. **Increaser #1:** This includes a group of plants that usually increase on rangelands with moderately heavy grazing pressure, but with abuse and severe conditions, will ultimately decline and be replaced by more aggressive increaser species and non-natives.
gynoecium:	Carpels of a flower collectively.
habit:	The general appearance, growth manner and form of a plant.
habitat:	Natural environmental conditions and place in which a plant naturally occurs.

head:	A dense, compact inflorescence on a short receptacle or axis, strictly speaking, a racemose arrangement.
herb:	Annual to perennial plants with the above ground portion dying back to ground level at the end of each growing season.
herbaceous:	A herb; also referring to a leaf-like texture and color.
hermaphroditic:	A flower containing both sexes.
homosporous:	Producing only one type of spore, these becoming gametophytes that produce both male and female structures.
hypanthium:	The ring around the ovary (receptacle) formed by the lower perianth parts and androecium (this marginal), varying from saucer, cup, or tubular-shaped.
hypogynous:	Perianth and stamens attached to receptacle.
immersed:	Growing entirely under water.
imperfect:	Flowers lacking either stamens or pistils.
included:	Contained within, not projecting beyond other surrounding organs.
indicator species:	Plant species that reveal something about site or environmental traits or conditions. Includes references to range condition (high cover of rough fescue indicates good condition) and ecosite type (cloud berry indicates acidic bog ecosites).
inferior(ovary):	An epigynous flower, having the flower parts attached to a hypanthium that projects above the ovary.
inflorescence:	Referring to the type of flower arrangement on an axis; more generally, means flower cluster.
innovation:	A vegetative shoot arising from the base of a main stem.
internode:	The portion of stem between two adjacent nodes.
introduced plants:	Plants brought into an Ecoregion that were not part of the original population. These are primarily species not native to North America.
involucre:	A set of bracts subtending a flower cluster.
involute:	Having the margins rolled inward, concealing (or partially so) the upper (ventral) surface.
irregular(flower):	Having like organs (petals or sepals) dissimilar.
keel:	A sharp longitudinal ridge, as on some grass blades, some sepals etc; the lower two united petals in most *Leguminosae*.
lacerate:	Having the margins irregularly and sharply torn.
lanceolate:	Lance-shaped, similar to ovate (widest below middle and tapering above) but narrower, generally several times longer than broad. Base from narrowed to broader-rounded.
lateral:	Referring to the sides rather than base or apex.
latex:	The milky liquid produced by some plants containing particles of terpenes (hydrocarbons in volatile oils).
leaflet:	A single unit of a compound leaf.
legume:	Generally, refers to any plant in *Leguminosae*; also, the fruit of members of this family, consisting of a dry pod originating from a single carpel, dehiscent along two longitudinal sutures.

lemma:	The lower and usually larger of two bracts subtending each flower in *Gramineae*. Lemmas sterile or without palea in some species.
lenticels:	The small, raised spots on bark, consisting of loosely organized, mostly unsuberized cells.
ligule:	In *Compositae*, refers to the strap-shaped ray flowers; in grasses and sedges, the small thin appendage projecting from the inner leaf surface at the junction of sheath and blade.
limb:	The expanded part of a leaf or corolla, specifically, in gamopetalous corollas.
linear:	Having a very long, narrow shape, the sides essentially parallel.
lip:	One of the two main segments in a bilabiate (two-lipped) corolla; the upper (apparently lower) petal in orchids.
loment:	The fruit of some legumes in which the pod is constricted and jointed between 1-seeded segments.
lyrate:	Pinnate, the terminal lobe considerably larger, often rounded.
megaspore:	Larger spores which become the female gametophyte.
membranous:	Thin and soft, flexible, often transluscent.
microspore:	The small spores that give rise to the male gametophyte.
midrib:	The central vein.
moisture regimes:	The amount of moisture available for plant growth. Influenced by such factors as soil texture (internal drainage), slope (external drainage), total amounts of precipitation, topographic position, soil surface conditions. The following are recognized: • **Hydric**: Saturated conditions, water removal so slow that water table is permanently at the soil surface. • **Subhydric**: Soils wet to an extent that permanent water table is near the surface most of the year; discharge also likely. • **Hygric**: Soil moist for the majority of the growing season; permanent discharge areas. • **Subhygric**: Water removal slow enough to prevent drying for extended periods during the growing season; precipitation and discharge water sources. • **Mesic**: Moderate water removal following precipitation, soil moisture generally persisting for moderate periods of time. • **Submesic**: Water removal moderately fast following precipitation, available for short periods following precipitation. • **Subxeric**: Water removed rapidly following precipitation, but soil moisture persisting somewhat longer than in xeric conditions. • **Xeric**: Water removal rapid, soil moist for brief periods following precipitation. • **Veryxeric**: Water removal very rapid; soils dry most of the time following precipitation.
montane:	Located on the lower slopes of the mountains.
muriform:	Arranged like rows of bricks.
muskeg:	A sphagnum peatland with associated woody species such as *Larix laricina*, and especially *Picea mariana*.
mycorrhyzal:	Having symbiotic fungus associated.

naked:	Lacking structures normally present on other like organs (i.e. naked buds lack scales).
native plants:	Plants that were originally present in a given plant community or Ecoregion; more broadly, plants native to North America.
nectary:	A gland that secretes nectar, usually located on a flower.
nerve:	A prominent vein (usually longitudinal) on an organ.
neutral:	A flower having neither stamens nor pistils.
node:	The point of attachment on a stem from which leaves, branches, and in some cases roots arise.
nodulose:	Having minute knobs.
nut:	A dry, indehiscent fruit with a hard wall, usually 1-seeded. Larger and harder than an achene.
nutlet:	A small nut; achene-like but hard-walled.
obcordate:	Heart-shaped but inverted, the point at the base.
oblanceolate:	Elongated and narrowed at both ends like lanceolate, but with the broadest part at or above the middle.
oblique:	Slanting and with unequal, varying widths.
oblong:	Elongate-rectangular, having sides more or less parallel, the base and apex rounded.
obovate:	Similar to ovate, but with the broadest part above the middle, the base cuneate, the apex broadly acute.
obsolete:	Essentially lacking; also refers to structures reduced such that they are barely detectable.
ocreae:	A sheath, derived from the stipule, that surrounds the stem just above the leaf base.
opposite:	Situated directly across from each other at a node; placed directly in front of rather than beside (alternate) another organ (i.e. stamens opposite sepals).
oval:	Broadly elliptical.
ovary:	Part of the pistil or carpel containing the ovules.
ovate:	Similar to oval, but broadest below the middle.
palea:	The upper of the two bracts enclosing each flower in *Gramineae*. Absent in some species.
palmate:	Having 3-several nerves, branches, lobes or leaflets arising and radiating from one point.
panicle:	A branched (compound raceme) cluster of stalked flowers, with lowest branches longer and flowering first.
papilionaceous:	Flower with banner petal, 2 wing petals and 2 partly joined keel petals.
papillose:	Covered with minute, rounded-blunt projections (papillae).
pappus:	The modified calyx at the apex of the ovary and remaining attached to the achene, most commonly seen in many *Compositae*.
parasite (in botany):	A plant deriving its nutrients from another plant to which it is attached.

parted:	Deeply cut, from ½ way to near the base or midvein.
pedicel:	Stalk of individual flower.
pedicellate:	Borne on a pedicel.
peduncle:	Flower stalk or stalk of an inflorescence.
perennial:	A plant (or part) that lives more than two years.
perfect:	Flowers with both androecium and gynoecium, with or without perianth.
perianth:	All the sepals and petals collectively.
pericarp:	The wall of a fruit.
perigynium:	The sac-like bract enclosing the achene in *Carex.*
perigynous:	Perianth and stamens united below ovary.
persistent:	Remaining attached after normal function has been completed.
petal:	A member of the internal floral ring (corolla), often showy to attract pollinators, absent in some species.
petiole:	A leaf stalk.
phyllopodic:	Having lowest leaves with well developed blades rather than reduced and scale-like.
pinnae:	The primary segments in a pinnate leaf.
pinnate:	A compound leaf with leaflets arranged on both sides of an elongate axis.
pistil:	The female organ or gynoecium (includes stigma, style, ovary) of a flower, composed of one or more fused carpels, the number of carpels often evidenced by number of locules, placentae, stigmas or styles.
pistillate (flower):	A flower having pistil(s) only and no stamens.
pod:	Generally referring to any dry, dehiscent fruit.
pollen:	The pollen grains, or male gametophytes appearing as a yellow powder on the anthers.
pome:	A fruit from an inferior ovary, with a fleshy outer layer composed of the ripened ovary as well as including ripened receptacle and calyx. The inner papery or bony endocarp encloses the seeds.
prickle:	A spiny outgrowth from the epidermis.
primocane:	First-year canes in *Rubus*. Second year, reproductive canes referred to as floricanes.
pubescent:	Having hairs present, referring to all types of hairs.
pulvinus:	Cushion-like; also, a swelling at the base, such as on a leafstalk.
raceme:	An elongate unbranched inflorescence, of stalked flowers along a common axis.
rachilla:	The axis of the spikelets in grasses and some sedges.
rachis:	The main or central axis as in a compound leaf or raceme or spike.
radiate:	In *Compositae*, having ray flowers.
ray:	The ligule or ligulate flower in *Compositae*; a branch of some types of inflorescence, i.e. of an umbel.

receptacle:	The end of the stem (pedicel) to which the flower parts are attached; in *Compositae*, the end of the peduncle to which the flower head adheres.
recurved:	Abruptly bent backward.
regular:	Having all members of each organ type (petals, sepals etc.) similar in size, shape and orientation.
reticulate:	Forming a network of veins.
retrorse:	Directed downward or backward.
retuse:	With a small notch on a rounded leaf.
rhizome/ rhizomatous:	Having rhizomes.
rhizome/ rootstock:	An underground stem, horizontal to ascending, elongating and producing shoots and roots at intervals.
rib:	A prominent longitudinal vein.
roseate:	In the form of a rosette.
rosette:	A circular arrangement of like organs (i.e. leaves), often basal.
rudimentary:	Imperfectly and poorly developed but usually visible with close observation.
rugose (rugulose):	Wrinkled.
runner:	A slender, elongate prostrate stem or branch, rooting at the nodes; similar to stolon, but more slender.
salverform:	Corollas with a slender tube and abruptly spreading into a limb.
samara:	A dry, indehiscent, mostly 1-seeded fruit.
scabrous:	Roughened.
scale:	Generally applied to any small, thin, flat structure (i.e. the floral bracts in *Salix*).
scapose:	With flowers on a leafless stalk (scape).
scarious:	Thin, dry, pale, not green (like hyaline but less transparent).
sepal:	The outer (sometimes only) floral ring, collectively called the calyx. Only rarely are sepals considered absent and petals present.
septate:	Divided into partitions.
sericeous:	Hairs that tend to be long, appressed,silky.
sessile:	Stalkless.
setae:	Bristles.
setose:	Beset with bristles.
sheath:	The lower part of a leaf blade that clasps and encloses the stem.
shrub:	A woody plant, mostly less than 5 m. tall and usually with several stems.
silicle:	Essentially a silique, but short.
simple:	In leaves, the leaf all in one piece although it can be variously divided; in pistils, only having a single carpel.
smooth:	Lacking both any roughness and also pubescence.

soil orders:	Major groups of soils, varying in amount of horizon development, and each developed under specific vegetation and moisture conditions. • **Brunisolic:** Developed under a wide variety of conditions, less developed horizons than luvisols, often lacking AE, but more developed than regosols. Often iron-rich and reddish. • **Chernozemic:** Well developed horizons, the surface or topsoil darkened from decomposed organic matter; developed under grasslands. • **Gleysolic:** Soils developed under wet, waterlogged conditions. • **Luvisolic:** Soils developed under forest or forest/grassland transition, with the evidence of clay movement from the A to B horizon. • **Organic:** Soils developed from deep accumulations (more than 40-60 cm. deep) of decaying organic matter, sedges, moss and peat. • **Regosolic:** Little horizon development, least A and B development of all common soil orders. • **Solonetz:** Sodium-enriched soil, with a very hard B horizon; saline soils.
sorus (sori):	A cluster of sporangia.
spathe:	A large solitary floral bract, subtending an inflorescence.
spike:	An inflorescence with sessile (subsessile) flowers on an elongated axis.
spikelet:	In *Gramineae*, the small unit of a flower, usually consisting of 2 glumes, palea and lemma, male and female reproductive structures; more generally, any small spike.
spine:	Strictly speaking, a sharp-pointed, stiff structure, considered to be a modified leaf or stipule; generally, any structure appearing as a spine.
spore:	A reproductive body, one-celled and without an embryo (as in ferns); in angiosperms, the first cell of the gametophyte (n) generation.
spur:	A hollow extension (appendage) from the calyx or corolla.
squarrose:	Abruptly curved-spreading from some point above the middle (i.e. in awns of some grasses).
stamen:	The microsporophyll in an angiosperm (male organ) consisting of an anther and filament, producing pollen.
staminate:	Flowers having stamens but no pistils.
standard:	The banner, the large upper petal in papilionaceous flowers (i.e. legumes).
stellate:	Star-shaped, often referring to hairs.
sterile:	A plant that does not produce spores or seed.
stigma:	The portion of the style capable of receiving pollen, usually terminal.
stipitate:	Having a stalk-like support of an ovary.
stipulate:	Having stipules.
stipule:	One or two small appendages often present at the base of a leaf petiole.
stolon:	An elongate, creeping stem that roots at the nodes or apex, producing new plants. Usually not used for similar structures that are produced below the ground surface.
stoloniferous:	Producing stolons.

strict:	Straight and upright, not spreading or lax.
strobilus:	A cluster of scales forming a cone.
style:	The part of a pistil connecting stigma and ovary.
stylopodium:	The enlarged, disc-like expansion at the base of a style (common in *Umbelliferae*).
sub:	A prefix meaning almost/not quite, or beneath.
succulent:	Fleshy and juicy from the accumulation of water in the tissues.
sucker:	A shoot originating from below the soil surface.
superior (ovary):	Attached to the centre or summit of the receptacle, above other flower parts and free from them (can be hypogynous or perigynous).
taproot:	A prominent vertical root, thickened upward.
taxon:	A taxonomic entity (pl. taxa).
tendril:	A modified stem or leaf, slender and coiling-twining, enabling a plant to support itself on other vegetation or structures.
terete:	Rounded, not flattened in cross-section.
testa:	A seed coat, originating from the integuments of an ovule.
thallus (thallois):	Plant material without clear definition of leaves, stems ect.
thorn:	Strictly speaking, a modified stem, rather short, stiff, sharp-pointed, stouter than bristles or prickles or spines.
throat:	The junction of the tube and limb of a corolla.
tomentose:	Having a tomentum, or hairs that are woolly, tangled, matted.
torulose:	Cylindric, and having swollen structures at certain intervals.
trailing:	Prostrate but not rooting.
tree:	A woody plant mostly over 5 m. tall, mostly with single stems.
truncate:	Having the base or apex abruptly and transversely straight, as if cut off.
tuber:	Strictly speaking, a thickened part of a rhizome, functioning in food storage and also often in reproduction.
tubercle:	A small, rounded projection or swelling; in some *Cyperaceae*, the swollen, persistent style base.
tubular:	A tube-shaped corolla, with little expansion upward.
turbinate:	Top-shaped.
turion:	A small, bulb-like offset, seen in some species of *Epilobium*.
umbel:	A flower cluster (strictly speaking, a raceme) where all pedicels arise from a common point. A compound umbel has main branches again umbellately branched.
umbo:	A rounded elevation or protuberance on an organ (i.e. on the scales of pine cones).
undulate:	Wavy.
unisexual:	Imperfect, flowers with just stamens or ovaries, not both.
utricle:	A small, thin-walled, 1-seeded, somewhat inflated fruit.

valvate:	Having margins meeting but not overlapping; opening by valves.
valve:	One of the portions of the pod wall into which a capsule separates at maturity.
vein:	A vascular bundle.
venation:	Arrangement pattern of veins.
ventral:	The inside surface, the surface (adaxial) facing the axis.
verticil:	A whorl.
villose:	Hairs that are long, soft, kinky but not matted (as in tomentose).
viscid:	Sticky, greasy or glutinous.
whorl:	A group of more than 2 similar structures arising from the same node.
wing:	Any thin, flat, usually membranous expansion on a structure; in *Leguminosae*, one of the two lateral petals.
woolly:	Covered, usually densely so, with long, matted, tangled hairs.